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NINTH
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EDITORIAL NOTE

Although final responsibility for these *Proceedings* lies with the Secretary, many persons have contributed to the editorial labor of their preparation. Professor Raymond Dodge, as Chairman of the Program Committee, originally received and classified the abstracts. The membership list is the work of Professor W. S. Hunter and Miss J. C. Spence for the American members, and of Professor H. S. Langfeld and Miss E. C. Roat for the foreign members. Professor M. F. Washburn has edited the foreign abstracts; Mr. D. W. Chapman has read the proof of the German abstracts and Dr. L. D. Boring the proof of the French abstracts. Mrs. F. K. Withington has corrected the program to make it a record of what actually occurred and has been of constant assistance in general editorial matters. Dr. Katherine A. Williams, as assistant editor, has, however, contributed more than anyone else to the accuracy of the present volume and has, indeed, relieved the Secretary of almost all editorial detail.

EDWIN G. BORING, *Secretary*

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Morgan Upton, Harvard. The geotropic conduct of young guinea pigs. See pages 452 f.

Heinrich Klüver, Institute for Juvenile Research. The equivalence of stimuli in monkeys. See pages 263 f.

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E. H. Cameron, Illinois. Contribution of psychology to educational methodology. See page 111.

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J. E. Downey, Wyoming. Psychological doctrine and teaching experience. See pages 150 f.

A. C. Eurich, Minnesota. An experimental study of the reading abilities of college students. See pages 160 f.

R. H. Gault, Northwestern. On discrimination of forms of speech by tactual stimulation. See pages 178 f.

M. E. Haggerty, Minnesota. American psychology and instructional problems. See pages 205 f.

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J. C. Bell, College of the City of New York. Contributions of psychology to secondary education. See pages 70 f.

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J. F. Dashiell, North Carolina. Some changes in psycho-motor efficiency in a diabetic with excess and deficient insulin injections. See page 137.

R. H. Paynter, Long Island University. Some psychological findings in drug addiction. See pages 334 f.

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C. R. Griffith, Illinois. Experimental studies on fitness. See pages 194 f.

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William Healy, Judge Baker Foundation. What is maladjustment? See page 214.

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S. T. Orton, New York, N. Y. Organic backgrounds in maladjustments.

W. E. Blatz, Toronto. What is maladjustment?

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U. Ebbecke, Bonn. Der psychogalvanische Reflex in der Narkose. See pages 155 f.

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Joseph Jastrow, New York. The conflict of the psychologies. See pages 235 f.

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W. B. Pillsbury, Michigan. The immediately given for psychology. See pages 344 f.

Madison Bentley, Cornell. The nature of experiment in psychology (by title). See page 71.

L. Wynn-Jones, Leeds. Some aspects of mental inertia. See pages 241 f.

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J. H. Forsberg, Karlsberg. The understanding and the memory (by title). See pages 167 f.

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Carlyle Jacobsen, Institute of Juvenile Research. A study of cerebral function in the Rhesus monkey. See page 234.

G. P. Zeliony, Veterinarian Institute, Leningrad. Method of investigation of associative reactions (by title). See pages 502 f.

H. S. Liddell, Cornell. Cinema demonstration of conditioned reflexes in the sheep.

J. A. Gengerelli, Yale. The law of least effort in animal behavior. See pages 179 f.

F. L. Ruch, Washington University. A comparison of the effects of hunger and of escape from water as motivating conditions.

V. M. Borovski, Moscow. Experiments on variable habits. See pages 88 f.

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Helge Lundholm, McLean Hospital. The evolution of the concept of the altrocentric and egocentric tendencies. See pages 293 f.

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F. K. Shuttleworth, Yale. The integration of character. See pages 394 f.

CHARACTER AND PERSONALITY

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E. F. Heidbreder, Minnesota. Temperament and accomplishment. See page 216.

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Goodwin Watson, Teachers College, Columbia. Some factors related to happiness. See pages 473 f.

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Hans Rupp, Berlin. Ueber Intelligenz. See pages 377 f.

William Stern, Hamburg. Zum Begriff der Intelligenz. See pages 409 f.

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H. M. Johnson, Mellon Institute. A typical paradox in the results of 'measurements of intelligence.' See pages 239 f.

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Donald Slesinger, Yale. Some methodological problems fundamental to a proper coördination of law and psychology. See pages 396 f.

Joseph Jastrow, New York, N. Y. Deviate and criminal behavior. See pages 237 f.

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Rose S. Hardwick, Boston, Mass. Minor handicaps in early years as a causative factor in delinquency. See pages 209 f.

A. H. Arlitt, Cincinnati. Atypical behavior and reactions to punishment in early childhood. See page 61.

H. T. Woolley, Teachers College, Columbia. Are tendencies to criminal behavior observable and alterable in young childhood? See page 493.

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E. A. Doll, Vineland, N. J. Relation of intelligence to criminality. See page 149.

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Augusta Bronner, Boston, Mass. A psychological examination of legal testimony. See pages 97–99.

H. E. Burtt, Ohio State. An evaluation of laboratory methods for the detection of crime. See pages 106 f.

A. R. Luria, Moscow. A new method of expressive motor reactions in studying affective traces. See pages 294–296.

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C. J. Warden, Columbia. Punishment as a deterrent in animal reactions. See pages 468 f.

T. H. Haines, New York, N. Y. The psychology of violence in punishment. See pages 207 f.

C. I. Erickson, State College of Washington. An attempt to determine what types of criminals may be safely paroled. See page 159.

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James Drever, Edinburgh. Meaning as affective. See pages 152–154.

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F. C. S. Schiller, Oxford. Meaning. See page 381.

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M. Ponzo, Turin. Fenomeni di annullamento percettivo con stimoli sopraliminali. See pages 346 f.

W. Wirth, Leipzig. The threshold as a variable. See pages 490 f.

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HENRI PIÉRON, Paris. Douleur et sensation. See pages 340 f.

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KARL BÜHLER, Vienna. Erlebnis, Benehmen und Werk (by title). See pages 102 f.

HELGA ENG, Oslo. Is the plethysmographic method sufficiently utilized for the study of emotion? (by title). See pages 156 f.

T. L. KELLEY, Stanford. The definition and measurement of native ability. See pages 251 f.

H. A. TOOPS, Ohio State. Empirical psychology and the 'generalized' regression equation. See pages 442 f.

S. W. FERNBERGER, Pennsylvania. The use of equality judgments in psychophysical procedures. See pages 164–166.

WILHELM WIRTH, Leipzig. Die exacte Kontrolle des inneren Verhaltens in der Psychophysik. See pages 488–490.

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G. A. JAEDERHOLM, Sweden. An experiment in social psychology.

D. Katz, Rostock. Gebärdensprache und Entwicklungspsychologie. See pages 248 f.

I. L. G. Sutherland, Victoria University, N. Z. The study of Maori mind. See pages 419–421.

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Arnold Gesell, Yale. Systematic aspects of developmental psychology. See pages 180 f.

Kurt Lewin, Berlin. Die Auswirkung von Unweltkräften. See pages 286–288.

Luton Ackerson, Institute of Juvenile Research, Chicago. On a correlational analysis of children's behavior problems. See pages 53 f.

Florence Goodenough, Minnesota. Interrelationships in the behavior of young children. See pages 185 f.

Hoken Kirihara, Kurashiki. On the mental development of the Japanese (by title). See pages 255 f.

L. S. Vygotsky and A. R. Luria, Moscow. The function and fate of egocentric speech. See pages 464 f.

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C. L. Hull, Yale. Controlled experimental investigation of hypnotic phenomena (by title). See page 230.

D. B. Klein, Texas. The experimental production of 'dreams' during hypnosis. See pages 256–258.

English Bagby, North Carolina. Assimilation, sublimation and repression (by title). See pages 65 f.

W. S. Taylor, Smith. Science and cult. See pages 423 f.

Joseph Jastrow, New York, N. Y. The psychology of minor deviations. See pages 236 f.

E. A. Doll, Vineland, N. J. Opportunities for research in public institutions (by title). See page 148.

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J. W. Bridges, McGill. What is abnormal psychology? See pages 94 f.

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David Slight, McGill. Hallucinations in the sane. See pages 397 f.

Florence Mateer, Columbus, Ohio. Mild hypothyroid cases of the normal intelligence level (by title). See pages 296 f.

A. A. Roback, Cambridge, Mass. Writing mistakes in the normal and the abnormal. See pages 361 f.

I. C. Sherman, George Washington. The relation of environmental factors to the reactions of the insane (by title). See pages 391 f.

G. V. N. Dearborn, U. S. Veterans Hospital, N. Y. Mental deterioration (by title). See page 141.

T. V. Moore, Catholic University. The empirical determination of the syndromes of psychiatry. See pages 315 f.

J. J. B. Morgan, Northwestern. Mental hygiene in schools (by title). See page 318 f.

R. N. R. Sarma, Presidency College, Madras. New light on dream psychology (by title). See pages 379–381.

CHILD DEVELOPMENT

J. E. Anderson, Chairman

A. G. Decroly, Brussels. Social reactions of the baby. See pages 143 f.

Arnold Gesell and Helen Thompson, Yale. A method for the normative study of behavior development in infancy (by title). See pages 181 f.

Käte Wolf, Vienna. Baby tests: a series for the second year of age (by title). See pages 491 f.

Mary Shirley, Minnesota. A developmental study of walking. See pages 393 f.

H. M. Halverson, Yale. An experimental study of prehension in infants. See pages 208 f.

Charlotte Bühler, Vienna. Spontaneous reactions of children in the first two years. See pages 99 f.

Beth L. Wellman, Iowa. Speech sounds of pre-school children. See pages 480 f.

P. H. Furfey, Catholic University. The measurement of developmental age. See pages 173 f.

G. D. Stoddard, Iowa. Concerning some ages, indices, and quotients in child development. See pages 413 f.

Dorothy S. Thomas, Columbia. New techniques for studying the social behavior of the young child. See pages 427 f.

W. E. Blatz, Toronto. Emotional episodes in nursery school children. See page 85.

Mandel Sherman, Washington Child Research Center. Phantasy types: their relation to conflicts and hallucinations. See pages 392 f.

K. M. Banham Bridges, McGill. A genetic theory of the emotions. See pages 96 f.

C. O. Weber, Wells. The nature and measurement of emotional age. See pages 474 f.

Laura Chassell Toops, Columbus, Ohio. Experiment in the control of the eliminative functions. See pages 444–446.

W. C. Olson, Minnesota. The quantification of direct observation. See pages 327–329.

F. B. Knight, Iowa. A study of learning in the case of young children (by title). See page 265.

M. L. Reymert, Wittenberg. An experimental clarification of the ontogenetic development of certain ' concepts ' (by title). See page 355.

J. E. Anderson, Minnesota. The objects of scientific inquiry in child psychology. See pages 58 f.

Jean Piaget, Geneva. Le parallelisme entre la logique et la morale chez l'enfant. See pages 339 f.

EYE-MOVEMENTS

W. R. Miles, Chairman

W. R. Miles, Stanford. Eye-movements during profound sleepiness. See pages 308 f.

Raymond Dodge, Yale. Fundamental steps in the development of adaptive behavior of the eyes. See pages 146 f.

Serge Youriévitch, Paris. The ocular cineograph and the principal characteristics of the ocular movements. See pages 499–501.

Raymond Dodge and James C. Fox, Jr., Yale. Photographic records of normal and abnormal optic nystagmus. See pages 147 f.

LABORATORY AND TEACHING DEVICES

K. M. Dallenbach, Chairman

S. M. Newhall, Yale. A quiet electrical key. See page 326.

S. K. Chou, Stanford. A quadrant tachistoscope. See pages 117–119.

Emilio Mira, Barcelona. New apparatus for detecting the accuracy of the perception of speed. See pages 312 f.

J. P. Guilford, Nebraska. Some new laboratory and teaching devices. See pages 201 f.

S. H. Bartley, Kansas, and Harry Helson, Bryn Mawr. A modified kinohapt. See pages 67 f.

F. L. Dimmick, Hobart. Auditory apparatus. See page 146.

C. A. Ruckmick, Iowa. A new demonstrational model for tones and improved Sanford chronoscope. See pages 373 f.

S. R. Hathaway, Ohio. A new apparatus for the measurement of the galvanic response. See pages 213 f.

W. C. Beasley, Ohio State. Demonstration of the tone phaser. See pages 69 f.

A. Ford, Michigan. The group experiment as a teaching device. See pages 166 f.

Harold Schlosberg and Leonard Carmichael, Brown. Apparatus from the Brown Psychological Laboratory. See pages 381 f.

David Wechsler, New York, N. Y. Apparatus for the measurement of chronaxie.

Harry Helson, Bryn Mawr. The effects obtained from rotation of irregularly formed regions. See pages 219 f.

J. M. McGinnis, Yale. An apparatus for securing moving-picture records of eye-movements in young infants. See pages 304 f.

W. C. Valentine, Ohio State. The lectometer. See pages 456 f.

MEMORY AND LEARNING

E. S. Robinson, Chairman

A. G. Bills, Chicago. Tension in learning and association. See pages 75 f.

Warner Brown, California. Conscious concomitants of learning. See page 99.

Harvey Carr, F. Davis and F. M. Sauer, Chicago. The relative variability of words and nonsense syllables. See pages 115 f.

H. R. Crosland, Oregon. Prior knowledge and practice *vs.* other variables in the reading of proof. See pages 131–133.

C. R. Griffith, Illinois. Experimental studies on the function of plateaus in learning. See pages 196 f.

G. W. Hartman, Pennsylvania State. Determination of easy and difficult number combinations by immediate auditory memory. See pages 210–212.

T. C. Holmes and Leonard Carmichael, Brown. An experimental study of interrupted partial responses in stylus maze learning. See pages 224 f.

H. L. Koch, Texas. The relation between some modes of presenting material and efficiency in memorizing. See pages 267 f.

J. A. McGeoch, Arkansas. The influence of time interval and retroaction upon serial position values. See pages 303 f.

L. A. Pechstein, Cincinnati. Whole *vs.* part learning in relation to practice. See page 335.

A. S. Raubenheimer, Southern California. The effects of rest periods on learning curves in typewriting. See pages 354 f.

L. L. Thurstone, Chicago. A rational equation for the learning equation. See pages 437 f.

C. J. Warden, Columbia. Variations in length of pattern in a symmetrical animal maze. See page 468.

E. G. Williamson, Minnesota. The factor of learning in spelling ability. See pages 487 f.

E. S. Robinson, Yale. The present position of the concept of association (by title). See pages 363 f.

PSYCHOLOGY OF MUSIC

C. E. Seashore, Chairman

C. P. Heinlein, Lehigh. The effect of the musical modes on amplitude of tapping and on the nature of pianoforte performance. See pages 217 f.

M. T. Hollinshead, Iowa. The vibrato in violin playing. See page 224.

W. S. Larsen, Iowa. The rôle of tests of musical aptitude in an instrumental music-program in a public school. See pages 284 f.

Joseph Peterson and W. F. Smith, George Peabody. Habituation effects of the equally tempered musical scale. See pages 338 f.

Max Schoen, Carnegie Institute of Technology. The nature of the musical mind. See page 383.

R. H. Seashore, Oregon. Individual differences in rhythmic motor coördinations. See pages 385 f.

H. M. Stanton, Eastman School of Music. Psychological tests a factor in admission to the Eastman School of Music. See pages 406 f.

P. E. Vernon, Cambridge. The psychology of music: its scope and methodology. See pages 461 f.

RACE DIFFERENCES

Joseph Peterson, Chairman

Otto Klineberg, Montreal. An investigation of psychological differences between racial and environmental groups in Europe. See pages 261–263.

L. F. Clauss, Jerusalem. Auszug aus den Ergebnissen der psychischen Anthropologie (by title). See pages 119 f.

C. B. Davenport, Cold Spring Harbor, N. Y. Inter-racial tests of mental capacity. See page 140.

L. H. Lanier, Vanderbilt. An analysis of thinking reactions of white and negro children. See pages 282 f.

H. H. Long, Washington, D. C. Intelligence tests of negro children. See pages 292 f.

Address of the President of the American Psychological Association Wednesday Evening, September 4

K. S. Lashley, Behavior Research Fund. Basic neural mechanisms in behavior.

Formal Sessions, Thursday Morning, September 5

PHYSIOLOGICAL PSYCHOLOGY

Henri Piéron, Chairman

David Katz, Rostock. The development of physiological hypotheses as a basis for experimentation (by title). See pages 249–251.

J. P. NAFE, Clark. Critique of the concept of quality in felt experience. See pages 324 f.

J. VAN DER VELDT, Rome. The photographic registration of movements. See pages 459 f.

G. E. COGHILL, Wistar Institute. Individuation *vs.* integration in the development of behavior. See page 123.

WILLIAM McDOUGALL. Duke. Second report on a Lamarckian experiment. See pages 302 f.

N. I. KRASNOGORSKI, Leningrad. The biological investigation of cerebral activity in children (by title). See pages 274 f.

PSYCHOLOGY OF PERSONALITY

WILLIAM STERN, Chairman

HULSEY CASON, Rochester. The origin and nature of common annoyances. See pages 116 f.

DAVID WECHSLER, Teachers College, Columbia. On the range of human capacities. See pages 476 f.

P. E. VERNON, Cambridge, England. The impracticability of an objective test of personality. See pages 460 f.

WILLIAM HEALY and AUGUSTA BRONNER, Judge Baker Foundation. Reciprocal relationships between mental capacity and other aspects of the total personality. See pages 215 f.

HANS PRINZORN, Frankfurt. Die Bedeutung des metaphysischen Gegensatzes von Geist und Leben für die Psychologie der Persönlichkeit. See pages 352 f.

ABNORMAL AND CLINICAL PSYCHOLOGY

JOSEPH JASTROW, Chairman

L. BOUMAN, Utrecht. Involution psychoses. See pages 89–91.

H. DEB. B. ROXO, Rio de Janeiro, Brazil. Medical psychology in Rio. See page 369.

STEFAN BLACHOWSKI. Poznan. Arithmothymic inclinations in youth. See pages 81–83.

OTTO SEELING, Berlin. Psychologie und Heilpädagogik (by title). See pages 386–388.

Zygmunt Piotrowski, Columbia. Freudian causation. See pages 343 f.

R. G. Gordon, Bath, England. The physiological basis of repression and dissociation. See pages 189–191.

Leonhard Seif, Munich. Anxiety and the strange. See pages 388–390.

A. A. Grünbaum, Amsterdam. Beitrag zur Revision der Apraxiefrage. See pages 199–201.

Informal Symposia, Thursday Afternoon, September 5

THE NATURE OF *g*

C. Spearman, Chairman

S. A. Courtis, Michigan. General and specific factors from the point of view of growth. See page 130.

H. E. Garrett, Columbia. An experimental attack on the general factor, *g*. See pages 175 f.

T. L. Kelley, Stanford. The nature of *g*. See page 251.

M. F. Washburn, Vassar. The nature of *g*. See pages 470 f.

H. F. Adams, Michigan. The theory of two factors. See pages 54 f.

C. S. Slocombe, Boston, Mass. The nature of *g*. See pages 398 f.

PERSONNEL PSYCHOLOGY

W. V. Bingham, Chairman

A. W. Kornhauser, Chicago. The study of work-feelings. See page 272.

Otto Lipmann, Berlin. Arbeitspsychologische Ergebnisse der deutschen Wirtschaftsenquête. See page 289.

Douglas Fryer, New York University. An acceptance-rejection theory for both subjective and objective measurement of interests. See pages 172 f.

H. D. Kitson, Columbia. A method of measuring the interest of a worker in his work. See page 256.

C. S. Yoakum, Michigan. Analysis of factors in vocational progress. See page 495.

Laura Chassel Toops, Columbus, Ohio. Quantitative differences between highly successful and moderately successful educational leaders. See pages 443 f.

R. H. Seashore, Oregon. Progress in research on motor skills. See page 386.

H. E. Burtt, Ohio State. Psychological techniques for the study of highway safety. See pages 107 f.

PHYSIOLOGICAL PSYCHOLOGY

R. S. Woodworth, Chairman

Franklin Fearing, Northwestern. Physiological psychology of the seventeenth and eighteenth centuries with special reference to the theory of involuntary action. See pages 163 f.

W. T. Heron, Minnesota. The effect of frontal destruction upon the ability of the rat to retain the Stone multiple-T maze. See pages 220 f.

June E. Downey, Wyoming. Slant in handwriting and sinistral tendencies (by title). See pages 151 f.

Hudson Hoagland, Harvard. The Weber-Fechner law and the all-or-none theory. See pages 222 f.

H. E. Starr, Rutgers. A metabolic study of reaction and recall. See pages 407–409.

L. E. Travis, Iowa. The relation of voluntary movement to tremors. See pages 447 f.

A. Toltchinsky, Moscow. The practice of psychomotor functions (by title). See pages 440 f.

C. R. Griffith, Illinois. Measuring reaction-time to muscular load. See pages 195 f.

F. O. Smith, Montana. The patellar tendon-reflex as influenced by sleep, insomnia, nicotine, and hypnosis. See pages 399 f.

P. J. Kruse, Cornell. Inhibition in relation to the elimination of maladaptive responses. See pages 275 f.

R. P. Angier and T. W. Cook, Yale. Binocular and monocular relations in foveal dark-adaptation. See pages 60 f.

R. H. Gundlach, Washington. The dependence of tonal attributes upon phase. See pages 202 f.

J. J. B. Morgan, Northwestern. Effect of noises upon the human organism. See pages 317 f.

P. C. Young, Louisiana. A critical examination of the theories of suggestion. See pages 497 f.

C. R. Griffith and S. M. Corey, Illinois. Relation between exercise, learning and resistance to disease (by title). See pages 198 f.

SOCIAL PSYCHOLOGY

William McDougall, Chairman

J. F. Dashiell, North Carolina. An experiment on social influences upon individual work. See pages 138 f.

Goodwin Watson, Teachers College, Columbia. A comparison of group and individual performance at certain intellectual tasks. See page 473.

K. C. Mukherji, Dacca. Is gregariousness an instinct? (by title). See page 323.

J. T. MacCurdy, Cambridge, England. The biological significance of blushing and shame. See pages 301 f.

STATISTICAL METHOD

C. L. Hull, Chairman

T. L. Kelley, Stanford. Statistical method. See pages 252 f.

S. C. Larson, Chicago, Ill. A short method for solving normal equations. See pages 283 f.

M. A. May, Yale. A method for correcting coefficients of correlation for heterogeneity in the data. See pages 300 f.

Eugene Shen, Peiping. The measurement of relations between all-or-none attributes. See page 390.

L. L. Thurstone, Chicago. Functions *vs.* correlations. See pages 433–435.

H. A. Toops, Ohio State. A ' generalized ' statistics. See page 442.

M. J. Van Wagenen, Minnesota. The empirical verification of formulae in the process of correlation. See pages 457–459.

SLEEP

H. M. Johnson, Chairman

E. Claparède, Geneva. Théorie biologique du sommeil.

J. C. Foster, Minnesota. Hours spent in sleep by young children. See pages 168 f.

C. R. Garvey, Minnesota. An experimental study of the sleep of pre-school children. See pages 176 f.

C. R. Griffith, Illinois. An experimental study of the nature of sleep among athletes. See pages 193 f.

G. E. Weigand, Mellon Institute. Nocturnal motility: variations among individuals and groups. See pages 477 f.

T. H. Swan, Mellon Institute. Kohlschütter's ' depth-of-sleep ' curve. See pages 421 f.

M. Adelia Boynton, Minnesota. The postural habits of nursery-school children during sleep. See pages 93 f.

S. R. Hathaway, Ohio University. A photographic study of postures maintained for long periods during sleep.

H. M. Johnson, Mellon Institute. Rhythms and patterns of nocturnal motility. See pages 238 f.

FORMAL SESSIONS, FRIDAY MORNING, SEPTEMBER 6

EXPERIMENTAL PSYCHOLOGY

A. Michotte, Chairman

J. E. Coover, Stanford. Secondary criteria and threshold determination. See pages 128 f.

Gopeswar Pal, Calcutta. The difference limen in the perception of a continuously changing weight (by title). See pages 330 f.

R. H. Thouless, Glasgow. The identity of the absolute and differential thresholds. See pages 431 f.

F. Aveling, London. The perception of tachistoscopically exposed symbols.

U. Ebbecke, Bonn. Ueber den peripheren und zentralen Anteil der Nachbilder. See page 155.

Enrique Mouchet, Buenos Aires. La perceptibilité tactile de l' aveugle (by title). See pages 320 f.

PSYCHOLOGY OF INDUSTRY AND PERSONNEL

F. Roels, Chairman

W. V. Bingham, Personnel Research Federation, N. Y. Industrial psychology in America: an appraisal. See pages 76 f.

L. J. O'Rourke, Washington, D. C. A new emphasis in Federal personnel research. See pages 329 f.

I. Spielrein, Moscow. Psychotechnics in the U. S. S. R. See pages 404–406.

Otto Lipmann, Berlin. Psychologie und Arbeitswissenschaft.

M. S. Viteles, Pennsylvania. The *Gestalt* point of view in applied psychology. See pages 462 f.

S. Hellerstein, Moscow. The problem of training the intellectual functions. See pages 218 f.

Informal Symposia, Friday Afternoon, September 6

AESTHETICS

H. S. Langfeld, Chairman

C. C. Pratt, Harvard. Schopenhauer's theory of music. See pages 350 f.

C. A. Ruckmick, Iowa. Musical appreciation: a study of the higher emotions. See pages 372 f.

G. H. Green, University College of Wales. The early family situation of Edgar Allan Poe and its influence upon his later life and work. See page 193.

N. C. Meier, Iowa. Aesthetic intelligence: its nature and emergence. See pages 305 f.

Ivy G. Campbell, Wells. Objective forms in aesthetics. See pages 112 f.

Kate Gordon, University of California at Los Angeles. Beauty and memory. See page 189.

Elsie Murray, Ithaca, N. Y. The biopsychic genesis of aesthetic values. See pages 323 f.

Max Schoen, Carnegie Institute of Technology. The criterion for the aesthetic experience (by title). See pages 383 f.

H. S. Langfeld, Princeton. The nature of appreciation in aesthetics. See pages 281 f.

J. T. Metcalf, Vermont. Empathy and the actor's emotion. See pages 306 f.

C. E. Kellogg, McGill. A social-psychological version of the aesthetic attitude. See pages 253 f.

H. C. Sanborn, Vanderbilt. The problem of music. See page 379.

Wilhelm Wirth, Leipzig. Eine Welt jugendlicher Bildkunst. See page 488.

MENTAL TESTS

M. L. Reymert, Chairman

H. F. Adams, Michigan. Constant errors in tests. See pages 55 f.

L. D. Anderson, Western Reserve. Test reliability and the probable error formula (by title). See pages 59 f.

S. A. Courtis, Michigan. Maturation units for the measurement of growth. See pages 129 f.

Clara Chassell Cooper, Richmond, Ky. Standardization of method of report of tests (by title). See pages 125 f.

A. G. Decroly, Brussels. Sur le dessin comme test psychologique.

H. B. English, Antioch College. The reliability of a test. See pages 158 f.

F. S. Freeman, Cornell. Inadequacies of the correlational method in predicting academic survival. See pages 169–171.

A. R. Gilliland, Northwestern. Individual differences in age of mental maturity. See pages 183 f.

Florence L. Goodenough, Minnesota. Mental tests for preschool children. See pages 186 f.

T. H. Howells, Colorado. A test of persistence. See pages 229 f.

H. M. Johnson, Mellon Institute. The so-called 'coefficient of reliability.' See pages 240 f.

L. Wynn-Jones, Leeds. Units of measurement. See pages 242 f.

T. L. Kelley, Stanford. Units of measurement. See pages 252 f.

Fred Kuhlmann, Minnesota. The universal scale. See pages 277 f.

Otto Lipmann, Berlin. Zur Einordnung psychologischer Eignungsfeststellungen in das Wirtschaftsleben. See pages 289–292.

Florence Mateer, Columbus, Ohio. Mental tests and clinical psychology. See pages 297 f.

Emilio Mira, Barcelona. New directions in testing affectivity. See pages 313 f.

F. N. Maxfield, Ohio State. Subjective judgment and test procedure.

Rudolph Pintner, Teachers College, Columbia. Non-language tests (by title). See pages 345 f.

M. L. Reymert, Wittenberg. Qualitative and quantitative exploration of the Knox cube test. See pages 355–357.

Hans Rupp, Berlin. Die objective Leistung und die innere Bedeutung der Tests.

R. B. Spence, Teachers College, Columbia. The relation of age to tests of mental ability. See pages 403 f.

William Stern, Hamburg. Starre und freie Testserien. See pages 410 f.

P. M. Symonds, Teachers College, Columbia. Choice of items for a test on the basis of difficulty. See pages 422 f.

E. L. Thorndike, Teachers College, Columbia. Units of measurement. See pages 428 f.

L. L. Thurstone, Chicago. Units of measurement (by title). See pages 435 f.

H. A. Toops, Ohio State. The need for organization in the attack on the analysis of mental structure. See page 442.

R. S. Uhrbrock, Cornell. Estimating intelligence from photographs (by title). See pages 451 f.

J. Vabalas-Gudaitis, Kaunas. Ein stummes reaktologisches Testsystem zur Bewertung von naturlichen Schulleistungen (by title). See pages 455 f.

J. A. Levin, Leningrad. New methods of testing school attainments and intelligence in the practice of Leningrad schools (by title). See page 286.

Clara C. Cooper, Richmond, Ky., and Laura Chassell Toops, Columbus, Ohio. Resolution concerning reviews of the literature on mental tests. See pages 126 f.

MOTIVATION

H. A. Carr, Chairman

E. C. Tolman, California. Maze-performance as a function of motivation and of reward as well as of knowledge of the maze-paths. See pages 439 f.

J. J. B. Morgan, Northwestern. Clinical studies of motivation. See pages 316 f.

Floyd H. Allport, Syracuse. Motive as a concept in natural science. See pages 56 f.

A. W. Kornhauser, Chicago. *Instincts* in industrial psychology. See page 272.

C. L. Hull, Yale. The concept of motivation in psychology as viewed by a mechanist. See page 230.

REFLEXES

Hulsey Cason, Chairman

G. E. Coghill, Wistar Institute. The development of half-centers in relation to the question of antagonism in reflexes. See pages 121–123.

J. F. Dashiell, North Carolina. Some alleged inadequacies in reflexological interpretation (by title). See page 138.

L. E. Travis, Iowa. The complexity of the patellar and the Achilles reflex arcs. See pages 448 f.

Franklin Fearing, Northwestern. The variability of the tendon-reflex in the intact organism. See pages 161–163.

W. R. Miles, Stanford. The effect of environmental temperature on the patellar reflex. See pages 310 f.

Joseph Peterson and L. W. Allison, George Peabody College for Teachers. Controls of the eye-wink mechanism. See pages 336–338.

W. N. Boldyreff, Battle Creek, Mich. Two kinds of psychic reflexes, their nature, similarity and difference. See pages 87 f.

Henri Piéron, Paris. Le syncrétisme perceptif dans le méchanisme du réflexe conditionnel. See pages 341 f.

J. P. Froloff, Moscow. Physiological doctrine on conditioned responses in industry (by title). See pages 171 f.

N. Kostyleff, Paris. Further progress accomplished by reflexology (by title). See pages 273 f.

C. L. Hull, Yale. The dilemma of the conditioned defense reflex (by title). See pages 230 f.

H. S. Liddell, Cornell. The conditioned reflex method in experimental psychology. See pages 288 f.

T. L. Bayne, A. L. Windsor and E. S. Winters, Cornell. Conditioned motor responses in children (by title). See pages 68 f.

RELIGIOUS PSYCHOLOGY

E. D. Starbuck, Chairman

G. B. Cutten, Colgate. Visions in the War. See pages 134–136.

Hugh Hartshorne, Columbia. Objective evidence of the integration of character. See pages 211 f.

P. T. Hightower, Butler University. Biblical information in relation to character and conduct. See pages 221 f.

T. H. Howells, Colorado. An empirical study of religious conservatives as opposed to religious radicals. See page 228.

J. P. Hylan, Stoneham, Mass. A dynamic definition of religion. See pages 233 f.

E. D. Starbuck and Ivy Husband, Iowa. Space-time forms determining philosophical and religious beliefs and attitudes. See pages 407–409.

Karl Stolz, Hartford, Conn. Implications for religion of current movements in psychology. See pages 414 f.

Joseph Peterson, George Peabody College for Teachers. The measurement of beliefs of college students. See pages 335 f.

C. L. Stone, Dartmouth. Effect of college instruction on belief. See page 415.

G. B. Watson, Teachers College, Columbia. A technique for the study of worship. See pages 472 f.

SENSATION AND PERCEPTION

H. P. Weld, Chairman

H. G. Bishop, Wittenberg. Localization of visual film. See page 80.

Heinrich Klüver, Institute of Juvenile Research. Fragmentary eidetic images. See pages 264 f.

Herbert Woodrow, Illinois. Motor reproduction of rhythmical and temporal stimuli. See page 493.

P. T. Young, Illinois. A pseudophonic study of auditory space. See pages 498 f.

W. Köhler, Berlin, and D. Katz, Rostock. The development of physiological hypotheses as basic for experimentation. See pages 249–251 and 268–270.

Formal Addresses, Friday Evening, September 6

C. Spearman, University College, London. Creative mind. See pages 400 f.

E. L. Thorndike, Teachers College, Columbia. Fundamental factors in learning. See page 429.

Formal Sessions, Saturday Morning, September 8

THEORY AND HISTORY OF PSYCHOLOGY

Édouard Claparède, Chairman

Emanuel Miller, London. Psychopathological data for the body-mind problem (by title). See pages 311 f.

Andrew Juhász, Budapest. The body-soul problem (by title). See pages 244 f.

M. W. Calkins and E. A. McC. Gamble, Wellesley. The self psychology of the psychoanalysts. See pages 110 f.

J. H. van der Hoop, Amsterdam. Instinct and intuition in psychology. See pages 227 f.

Enrique Mouchet, University de la Plata, Argentine. L'image verbo-visuelle dans le mécanisme de l'intelligence (by title). See pages 321 f.

EUGENIO RIGNANO, Milan. Tendances affectives et instincts (by title). See pages 359–361.

CARL STUMPF, Berlin. Zum Grundgesetz der associativen Reproduktion (by title). See pages 417–419.

EXPERIMENTAL PSYCHOLOGY

WOLFGANG KÖHLER, Chairman

D. USNADZE, Tiflis. Einstellungsumschlag als Grundlage der Kontrasttäuschungen (by title). See pages 453–455.

GUSTAV KAFKA, Dresden. Zur Psychologie des Ekels. See pages 247 f.

C. E. SEASHORE, Iowa. The rôle of experimental psychology in the science of art and music. See pages 384 f.

OTTO KLEMM, Leipzig. Ansätze zu einer Theorie des Tuns. See pages 258 f.

E. L. THORNDIKE, Columbia. The strengthening and weakening of mental connections by their after-effects. See page 430.

KNIGHT DUNLAP, Johns Hopkins. Repetition in the breaking of habits. See page 154.

NINTH INTERNATIONAL CONGRESS OF PSYCHOLOGY

RESUMÉ OF THE CONGRESS

BUSINESS OF THE CONGRESS

ADDRESSES OF THE OPENING SESSION

RESUMÉ OF THE CONGRESS

THE Congress met at Yale University, at New Haven, Connecticut, from the first to the seventh of September. Members and guests, both men and women, were housed by the Universities in the beautiful Harkness Memorial Dormitories. Meals were served for members in the University Dining Hall. Scientific sessions were held in Sprague Hall, William L. Harkness Hall, and the Lampson Lyceum. The Memorial Quadrangle at the dormitories and the University Dining Hall served as social centers. In the latter there was tea every afternoon and a smoker every evening.

The attendance at the Congress is shown by the following table:

Members in attendance			
Foreign members			
Men	90		
Women	14		
		104	
American members			
Men	471		
Women	251		
		722	
			826
Absentee members			
Foreign members		141	
American members		152	
			293
			1119

Besides the 826 members in attendance, there were present at the Congress 14 wives of foreign members, 82 wives of American members, and 129 other guests, making a total attendance of 1051. Not all of these persons remained in New Haven for the entire week, but nearly a thousand were simultaneously present in the middle of the week. There were 554 persons at the banquet on Wednesday evening.

The 104 foreign members came from twenty-one foreign countries. They were distributed as follows:

Great Britain	22
Germany	17
U. S. S. R.	10
Holland	8
India	6
Austria, France, Japan, Switzerland	5 each
Belgium, Poland	4 each
Italy	3
China	2
Australia, Brazil, Denmark, Egypt, New Zealand, Norway, Spain, Sweden	1 each

The 722 American members came from forty-one of the forty-eight states, the District of Columbia, Porto Rico, Canada, and Mexico. The distribution was as follows:

New York	196
Massachusetts	80
Ohio	47
Illinois	42
Pennsylvania	40
Connecticut	39
Four states	20–29 each
Five states and the District of Columbia	10–19 each
Twenty-six states	Less than 10 each
Canada	15
Mexico, Porto Rico	1 each

The formal opening session of the Congress occurred on Monday morning with the address of welcome by President Angell of Yale University, who was also Vice-President of the Congress, the address of the President of the Congress, Dr. Cattell, the address of the Secretary of the International Committee, Professor Claparède, and the address of the United States Commissioner of Education, Mr. Cooper, the official representative of the American Government.

The formal sessions for scientific papers were held in the mornings, two or three sessions every morning. In the afternoon there were simultaneously many informal symposia or 'round-tables,' where short papers were read to smaller groups and where there occurred more extended discussion than was possible in the morning meetings. In the evening formal addresses were given by some of the more distinguished members of the Congress. On Wednesday evening, Dr. Lashley gave the annual presidential address of the American Psychological Association. Altogether 424 papers were read before the Congress. In arranging for so many papers, it was the hope of the Program Committee that the Congress and its Proceedings might come to represent a typical cross-section of psychology as it existed in 1929 and thus an event of some historical significance.

In the smoking room at the University Dining Hall there were exhibits of apparatus, and of psychological books published during the last three years.

On the social side, besides the smokers and teas, there was an informal reception by the members of the National Committee on Sunday afternoon and a formal reception by President Angell on Wednesday afternoon. A banquet for the members was held on Wednesday evening before Dr. Lashley's address.

Local excursions were held in and about New Haven and Yale University on Monday, Tuesday, Thursday and Friday afternoons. They provided opportunities for members and guests to visit museums, scientific institutes and other places of interest in the University, and for recreation in the neighborhood.

Before the sessions of the Congress many of its members were the guests of Princeton University on August 30, and of Columbia University on August 31. After the adjournment of the Congress some of the members were entertained by Clark University and others by Smith College on September 8, and both these groups became the guests of Harvard University on September 9. A few visited Wellesley College and Woods Hole on the following day.

MINUTES OF THE INTERNATIONAL COMMITTEE

The International Committee met on Thursday evening, September 5th, with Dr. Cattell in the chair. There were present: E. G. Boring, K. Bühler, J. McK. Cattell, E. Claparède, O. Decroly, R. Dodge, J. Drever, G. A. Jaederholm, K. Koffka, W. Köhler, H. S. Langfeld, O. Lipmann, W. McDougall, A. Michotte, E. Mira, H. Piéron, W. Pillsbury, M. Ponzo, F. Roels, E. Rubin, C. Spearman, W. Stern, R. H. Thouless, H. C. Warren, S. Yourievitch.

The International Committee added the following twenty-eight persons to its membership:

Brazil: H. deB. B. Roxo.
Canada: E. A. Bott.
Germany: G. Kafka, D. Katz, O. Klemm, K. Lewin, W. Wirth.
Great Britain: F. Aveling, Beatrice Edgell, L. Wynn-Jones.
Holland: L. Bouman, A. A. Grünbaum.
Hungary: P. Ranschburg.
India: M. V. Gopalaswami.
New Zealand: T. A. Hunter.
Poland: S. Blachowski.
Russia: I. P. Pavlov, A. B. Salkind, I. Spielrein, V. M. Borovski.
Switzerland: J. Piaget.
United States: J. R. Angell, W. S. Hunter, J. Jastrow, K. S. Lashley, E. L. Thorndike, Margaret F. Washburn, R. S. Woodworth.

It was voted that members of the International Commiteee who have been absent from three consecutive Congresses be automatically relieved as members of the Committee unless re-elected.

It was voted that the secretary of the preceding Congress be appointed associate secretary of the International Committee, to act for the Permanent Secretary in case of emergency in the interval between Congresses.

Invitations for the Congress to meet in Poland, Sweden, and Denmark were received. It was voted that the Ninth International Congress of Psychology, assembled in New Haven, accept with special pleasure the invitation, presented through Professor Rubin, to hold the Tenth Congress in Copenhagen in the last week of August, 1932; and that the Ninth Congress would welcome with great satisfaction the selection of Professor Höffding as President.

It was voted that thanks be expressed to Dr. Jaederholm for the invitation to Gothenburg, and that he be informed of the hope of the Congress that an acceptance of a renewed invitation may be possible in the not distant future. It was also voted that the appreciation of the Congress for the invitation from Poland be expressed.

The Committee also authorized the President to dispatch to Mrs. Titchener a telegram expressing the appreciation by the Congress of the service to psychology of Professor E. B. Titchener, and a telegram to Mrs. Morton Prince expressing the appreciation by the Congress of the service to psychology of Dr. Morton Prince. It further authorized the extension of formal greetings of the Congress to Professor Carl Stumpf and Professor G. Heymans.

Ed. Claparède, *Permanent Secretary*

BUSINESS MEETING OF THE CONGRESS

The business meeting of the Congress was held on Saturday morning, September 7th, with Dr. Cattell in the chair.

The actions of the International Committee were reported to the business meeting and unanimously approved. Dr. Cattell read telegrams of greeting and good wishes from Professor Heymans and Professor Dessoir.

Professor Spearman presented to the business meeting the following resolution on behalf of the foreign members of the Congress: "The foreign members of the Congress take this opportunity of expressing cordial thanks for the most hospitable welcome by Yale University, President Angell, who is himself one of the foremost psychologists of the day, the staff of the Psychological Department, and all others concerned in providing entertainment in a way which will always be gratefully remembered."

Professor Claparède expressed the thanks of the foreign members to Princeton University, and especially to Professor Warren, for the kind reception of visiting guests at Princeton. He also expressed thanks to Columbia University for its hospitality extended to foreign guests, and to Professor Cattell for the skill with which he presided over the Congress.

ED. CLAPARÈDE, *Secretary*

OPENING SESSION OF THE CONGRESS

ADDRESS OF WELCOME

James R. Angell

President of Yale University and Vice-President of the Congress

IT gives me unfeigned pleasure on behalf of Yale University to welcome the members of the Ninth International Congress of Psychology, the first to be convened in the western world, though we hope by no means the last. We trust that the occasion may prove in every way successful and that you may carry home with you only the most agreeable memories of a noteworthy week. The distinguished names appearing on the program augur well for such a result.

Our welcome is peculiarly warm to our foreign guests, most of whom have faced the perils of the deep—now perhaps more often dietetic than marine—in order to visit our shores and share with us the stimulating pleasures of social intercourse and intellectual exchange. The honor of their presence is keenly appreciated.

It is a truism that science knows nothing of national boundaries, and that the commonwealth of mind draws all men into its domain, so that in the pursuit of truth all may join in friendly rivalry. But it is equally true that physical remoteness, or cultural insulation, as well as the barriers of alien tongues, still serve to keep men from the fullest and most sympathetic understanding of one another's thought. To aid in overcoming such obstacles to a complete intellectual *rapprochement* among scientists of different nations speaking different languages, a Congress of this kind has an invaluable contribution to make.

In the last two decades even nations have learned much of the terrible futility of unmitigated hostility and, let us hope, of the ultimate possibilities of friendly coöperation. What has thus been found true in the political sphere can hardly fail to be found more true in the effort to push forward the frontiers of knowledge, an enterprise where the cultivation of common interests and curiosities need engender no fatal animosities, and where there exist abundant opportunities for the development of the most generous rivalries.

Among American institutions Yale may well lay claim to a peculiar historic connection with certain of the forerunners of present day psychological trends. Here it was that early in the 18th century the precocious Jonathan Edwards received his collegiate training, a man who left his mark, for better or for worse, on several generations of American theological and philosophical thought and even abroad enjoyed no small repute. At the tender age of ten he composed a treatise on the nature of the soul. At twelve he disclosed his latent affinity with the modern behaviorists by an essay on the habits of spiders, and in his treatise on the freedom of the will, the fruit of his mature thought, he went hopelessly behaviorist, to the extent of denying all freedom to that psychic organ whose very existence the extremer behaviorists refuse to accredit to human personality. Strange bedfellows these, the fundamentalist theologian of the 18th Century and the ultra-atheistic materialists of the 20th! Verily history hath her ironies!

Here in the latter half of the last century President Porter wrote his well known work on the Human Intellect, which long served as a textbook for American college students. And here still later George Trumbull Ladd, known personally to not a few of you, wrote the first inclusive treatise in the English language on physiological psychology, establishing one of the earliest and most productive of American psychological laboratories. Both events exercised a pronounced influence on the development of the laboratory movement in America. Here has recently been established the first American university institute of psychology now to be expanded into an institute for the study of human relations in their widest implications. From Yale also will be controlled, under the direction of my colleague, Dr. Yerkes, now in Africa, the anthropoid station presently to be established in Florida for the special purpose of breeding these extraordinarily interesting creatures, and for the furtherance of fundamental psychobiological studies.

I mention these facts not to exalt the status of Yale in the field of psychology, for many other universities in the western hemisphere have rendered equally distinguished service and have bred great leaders; but simply by way of assuring you of the deep and enduring interest in these subjects at Yale. You will readily understand in the light of such facts as I have cited why we were so eager to have you come here, and why we welcome you so enthusiastically to a terrain where psychology has long been energetically pursued.

Ladies and gentlemen, the keys of the University are in your hands. [And do not forget to keep them with you and to give them up when you leave!] All doors are open and we shall count it at once a pleasure and an honor to cater in every way within our power to your comfort and convenience.

And now I must give way to my distinguished friend, the President of the Congress, Dr. James McKeen Cattell, for many years a leader in American psychology, the first, and in many ways the most ingenious, as well as the most discreet and well poised, of the pioneers in the creation of a psychology based on objective methods. It is both impossible and unnecessary to rehearse even the major accomplishments of his long and eminent career. That he has been selected for the position he at present adorns is convincing testimony to the high esteem in which he is held by his professional colleagues: Dr. Cattell!

PSYCHOLOGY IN AMERICA

J. McKeen Cattell

President of the Congress

We welcome to America the psychologists of the world.[1] You have come from distant nations, but we are intellectual neighbors; your faces may be unfamiliar, but we are scientific friends. Biologically we of the North American continent are descended from every race and people; culturally we owe our civilization in the main to the older nations. We have received a great inheritance; may it be our part to return its fruits with usury. Eight times previously have these congresses of psychology met in six different countries. Americans have enjoyed their hospitality and have profited by their programs. Now the Ninth Congress has honored us by coming far from its origin and center. In its proceedings we are like Chaucer's clerk of Oxenford:

> And gladly wolde he lerne and gladly teche.

For ourselves and on behalf of our foreign members we have pleasure in expressing appreciation and obligations to the host of this Congress, Yale University, long a leader in education and in psychology, now forming large plans for the study of human relations.

I

A history of psychology in America prior to the last fifty years would be as short as a book on snakes in Ireland since the time of St. Patrick.[1] In so far as psychologists are concerned, America was then like Heaven, for there was not a damned soul there.

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[1] When this address was given there was distributed to the audience a brochure of twenty-four pages containing: (1) portraits of six American and two foreign psychologists—James, Hall, Ladd, Royce, Münsterberg, Titchener, Wundt and Galton; (2) tables and curves showing the number, distribution, work and publications of American psychologists at four different periods;

Jonathan Edwards, the theologian, and Benjamin Franklin, the practical man, were our most typical representatives. In our colleges mental and moral philosophy was indeed taught, mostly Scotch, the importation of which was not prohibited in those days. Noah Porter, president of Yale University from 1871 to 1886, gave us the most elaborate text-book; James McCosh, president at Princeton from 1866 to 1888, performed the greatest service by sheltering physiological psychology and organic evolution under the cloak of Presbyterian orthodoxy.

There was no science of psychology in America fifty years ago; it may be that there was no organized science of psychology in the world prior to 1879. In that year Wilhelm Wundt established at Leipzig the first laboratory, Th. Ribot published his "La Psychologie allemande contemporaine," Francis Galton his "Psychometric Experiments," William James the first chapter of a work on psychology. In so far as psychology dates from 1879, this Congress celebrates the jubilee of our science. The first Congress of Psychology met in Paris in 1889; the present Congress marks the fortieth anniversary of our international coöperation.

The pedigree of psychology, as of every science, can indeed be traced to Aristotle and the efflorescence of the Greek period, further back to the civilizations of Egypt and Asia Minor, dimly through the twilight and darkness hiding primitive men. If the making of fires and the use of tools, the cultivation of plants and the domestication of animals, were the beginnings of the physical and biological sciences, then psychology goes back to primitive speech, habits and customs. Perhaps the origins of psychology may be found in more remote pre-human, pre-mammalian and pre-vertebrate animals than those of any other science. The modern dog doubtless finds more differences between two individuals of its species than between a tree and a lamp-post that

(3) curves showing the results of unpublished experiments made from 1889 to the present time on effort, fatigue, learning and variation in measurement of individual differences in behavior and the practical applications of psychology. The address, with some of the illustrative materials, has been printed in *Science,* N.S. 70, 1929, 335–347; *Scient. Mo.,* 30, 1930, 114–126.

smell alike. Our early ancestors were mainly concerned with themselves, with their mates and their offspring, with the behavior of their fellows, of their prey and of their enemies. Satisfaction of desires, escape from danger and pain, efforts to foresee and to control the conduct of others, were the earliest and are the most fundamental of interests.

When such is so clearly the case, it may at first sight seem surprising that the sciences, both curious and useful, of matter and energy should have had an earlier origin and a more systematic development than the biological sciences, while psychology is only now taking its place among the descriptive sciences and has witnessed but its first beginnings as an applied science. The explanation is partly in the difference in stability and complexity of the objects of the different sciences. Matter is plastic to experiment and measurement; human behavior eludes experimental and quantitative methods. The motions of the solar system since its beginning are less complicated than the play of a child for a day. It is also the case that in the architectonics of science the mathematical and physical sciences are fundamental. Morphology and physiology are based on physics and chemistry; psychology on all these sciences. The foundations must be laid before we can build the upper stories, in which we may prefer to live and from which there may be the wider outlook.

A less obvious reason for the late development of psychology is the circumstance that it is easier to satisfy needs and to control behavior by altering the environment than by altering individuals. The savage could learn to shoot an arrow from a bow or to move a stone with a lever more readily than he could strengthen his own right arm. He could obtain food better by planting corn than by developing his skill as a hunter. And so it is to-day. By increasing economic production we can do more for the welfare of people than by teaching them to be virtuous and wise. In America we have constructed a great civilization, not by trying to be civilized, but by applying invention and organization to the exploitation of natural resources.

Psychology had to await the development of the exact and the natural sciences, whose objects are more open to measurement, whose contents are more basic, and whose applications are more useful. And it should be remembered that all the sciences, as we now know them, are comparatively new. The doctrine of the conservation of energy is only about as old as Professor Stumpf, the theory of evolution by natural selection about as old as Professor Jastrow. Modern physics and modern genetics are no older than the younger members of this Congress. When sciences of earlier origin have made such notable advances during the lifetime of those now living, we may look forward with hopefulness to a corresponding development of psychology within the lifetime of our children.

Fifty years ago William James, born in 1842, was assistant professor of comparative anatomy and physiology at Harvard; Stanley Hall, four years his junior, was a student in Germany. As to other American psychologists there were—as Franklin said when asked if he had any children—" none to speak of." James was transferred to an assistant professorship of philosophy in 1880 and appointed to a professorship of psychology in 1889, resuming after eight years a chair of philosophy. He published in 1890 " The Principles of Psychology," a work of genius not often equaled in any science or in any language. Hall received the doctorate of philosophy from Harvard in 1878, one of the first awards of the degree, and was appointed lecturer there and at Williams College in 1880. In 1883 he became professor of psychology and pedagogy in the Johns Hopkins University, giving also the courses on philosophy. In that year he established the first American laboratory of psychology, unless we count as such the work by James at Harvard under physiological auspices, in which case it would antedate the Leipzig laboratory.

George Trumbull Ladd, eight days younger than William James, was called to a professorship of philosophy at Yale in 1881; he published in 1887 his " Outlines of Physiological Psychology," the first American book on the subject and, as revised by Professor Woodworth, one of the best. In that year there was established a lectureship and in 1888 a professorship of psychology at the University of Pennsylvania. This chair, held by me, was the first in any university here or abroad to be so named and in which the work of the professor was confined to psychology, the department being coördinate with philosophy and other university disciplines. In the laboratory were given the first experimental courses for students, the work at Leipzig and the Johns Hopkins having been limited to research.

In rapid succession there were then established chairs of psychology and laboratories at Wisconsin under Professor Jastrow, at Indiana under Professor Bryan, at Nebraska under Professor Wolfe, at Brown under Professor Delabarre, at Wellesley under Professor Calkins, at Stanford under Professor Frank Angell, at Clark under Professor Sanford, at the Catholic University under Professor Pace, at Illinois under Professor Krohn, at Toronto and at Princeton under Professor Mark Baldwin. In 1891 a professorship and a laboratory were initiated at Columbia, a year later at Yale, Harvard and Cornell, Professor Münsterberg having been called from Germany to Harvard and Professor Titchener from England to Cornell. In this group should be included, for his contributions to psychology and education, John Dewey, professor of philosophy at Michigan, Minnesota, Chicago and Columbia. Josiah Royce, born in California in 1855, appointed assistant professor of philosophy at Harvard in 1882, a psychologist of distinction, alone bridges the gap between James, Hall and Ladd, our pioneers, and the second generation of American psychologists here in part enumerated.

The academic advance of psychology in America in the course of the four-year period from 1888 to 1892 is notable. There were no foundations as in Germany, England, France and Italy, in which countries a scientific psychology had for a hundred years or more been emerging from philosophy, and in which physics, physiology, zoölogy, neurology, psychiatry, and other sciences had for an equal period been assembling subject matter and methods that could be taken over by psychology. From our Declaration of Independence in 1776 until the founding of the Johns Hopkins University, exactly one hundred years, but little scientific research was accomplished in the United States and that little remote from psychology. There were Franklin, Rumford, Bache and Henry in physics, the Sillimans in chemistry, Gould and Chauvenet in astronomy, Peirce in mathematics, Torrey, Gray and Engelmann in botany, Agassiz, coming from overseas, Baird and Leidy in zoölogy, Dana, Hall, Lesley, Le Conte, Hilgard, and others in geology, a practical science. But few of them have an international standing; there was none who helped to make straight the way for psychology.

What we had in America prior to 1876 was a comparatively well-developed common school system, the beginnings of state universities, many denominational colleges. The research degree of doctor of philosophy was first given in 1861 by Yale. In the course of fifteen years that university conferred 18 of these degrees, Harvard 4, Columbia and Cornell 2 each. After 1876 there was a rapid development of universities and at the same time a large increase in the number of Americans who worked in Germany. Of our leading scientific men in 1903, 487 held the degree of doctor of philosophy or its equivalent. The universities awarding 10 or more of these degrees are: The Johns Hopkins 102, Harvard 57, Columbia 38, Yale 28, Cornell 26, Chicago 25, Clark 12, Michigan 10; in Germany, Leipzig 39, Göttingen 33, Berlin 22, Heidelberg 15, Munich 13. One was from Paris, two master of arts degrees were from Cambridge.

The main condition favorable to the remarkable academic advance of psychology from 1883 to 1900 was the growth of our universities. Previously mental and moral philosophy had in most cases been taught by the president of the institution, qualified for both offices by being a clergyman, and when this situation changed it was natural to continue the teaching of psychology by special students of the subject. The enlargement of the universities and the adoption of the elective system permitted the introduction of a new science. Our people had curiosity, acquisitiveness and energy, with ever-increasing wealth. We were able to take over what we wanted from abroad; we were not bound by precedents and traditions. Even after years in our environment

Professor Münsterberg claimed that "the presuppositions with which a science starts decide for all time the possibilities of its outer extension," and Professor Titchener said that he did not object to work on the measurement of individual differences in behavior so long as it was not called psychology. The psychologist has some reason to thank God when he is born a happy and irresponsible American child.

In comparison with literature and art, science is international. The velocity of light is the same whether measured by Fizeau in France or by Michelson in the United States. The electrons discovered by Thomson and measured by Millikan have the same hypothetical properties in Cambridge and in Chicago. The equations written by Einstein in Berlin are equally correct and equally relevant or irrelevant to the real world in Germany and in Japan. None the less the lines of advance followed by science are directed by the national life. It is not an accident that laboratory research in psychology is of German origin, that pathological psychology has been cultivated in France, that psychoanalysis has spread from Vienna, that Darwin and Galton were English, that objective psychology and the measurement of individual differences have had their chief development in the United States. Germany may keep its *Gestalt* psychology, France its hysterics, Austria its libido, England its 'g'; we shall continue to bear the burden of our meta-behaviorism.

America is part of the continuation of the cultural history of Europe. In psychology we owe to it everything up to the past fifty years, during which period there has been coöperation on terms that have now become equal. The two Europeans to whom our debt is the greatest are Wilhelm Wundt and Francis Galton. I had the privilege of working with both of them, as also with Herman Lotze and James Ward. Many Americans frequented the Leipzig laboratory, but perhaps only Titchener, who retained his British citizenship and outlook, continued its traditions. Stanley Hall and I were the first of Wundt's American students, but Hall worked in Ludwig's laboratory and I continued in my own rooms the work begun in America, in part because Wundt would not allow the testing in his laboratory of individuals who could not profit by introspection. Galton—the greatest man whom I have known—more nearly laid down the lines for the objective measurement of individual differences. But in his statistical methods of studying individuals he had been preceded by Quetelet and in America by Gould; in his study of imagery by Fechner, this work having been based on fallacious introspection. Wundt and Galton are the foreign psychologists whom we most honor, but it may be that if neither of them had lived psychology in America would be much what it is.

When Jefferson wrote in the Declaration of Independence that all men are created equal, he was referring to the inalienable rights to life, liberty and the pursuit of happiness. Where individual differences in rank and wealth are fixed by custom and law, they are taken as a matter of course. In a political and social democracy, such as has partly obtained in England and to a somewhat greater extent in the United States, attention is directed to the varying qualities of individuals. The wars of England are said to have been won on the playgrounds of its public schools. Competitive fellowships and scholarships, the mathematical tripos, arose in the English universities. The American college student wants to make his fraternity and the football team, sometimes also Phi Beta Kappa or Sigma Xi. Every boy may hope to become a Coolidge and get two dollars a word for his autobiography, or a Carnegie and try to make all university professors his pensioners. He learns that the race is to the swift and the battle to the strong. Those engaged at first in a conflict with nature, wild animals and savages, later in subduing the wilderness, now in the construction of a vast and complicated industrial civilization, are more likely to be interested in their own performance and in the conduct of others than to indulge in the refinements and the vagaries of introspection. It may be that there is American science and American psychology.

Of 84 Nobel prizes in science only five have been awarded in the United States, two of the recipients having been born abroad. No more were deserved. We have not excelled in broad generalizations based on abstract considerations; but we have done more than our share in invention and in the applications of science. It is scarcely necessary to name a few from the long list of advances on which modern life is based which have had their origin or chief development here. Omitting the steamboat, the railway and other applications of steam, these include the cotton gin, the reaper and other agricultural machinery; the sewing machine, the refrigerator, the vacuum cleaner and other household machinery; the typewriter, the manifolder and other office machinery; all sorts of factory, foundry and mining machinery and methods; steel and cement construction; central heating; electric light and electric power; the telegraph, the telephone and the radio; the phonograph and the motion picture; the automobile and the airplane. It may be that trial and success methods, so important in learning by the individual, are equally fundamental in learning by the race and in the advancement of science. Who devised the Greek temple and the Gothic cathedral? The most magnificent architecture since these is here arising before our own eyes, but no one knows who is responsible for it. The proximate cause of the New York skyscraper is an ordinance of a board of aldermen, prescribing that, in order to conserve light, high buildings must be recessed from the street.

The situation is the same in psychology. The advances in America are due to the work of uncounted individuals, many of them not known as psychologists. It appears that I was the first to publish psychological measurements of individual differences without regard to introspection and with special reference to their useful applications, but that is because I had the misfortune to be born a long time ago. So Columbia University and its Teachers College may have done the most—more than 150 members and associates of the American Psychological Association hold its doctorate—to advance objective, individual and group psychology, especially in its applications to education. In a sense this is due to Professor Thorndike, Professor Woodworth, and other leaders who have worked with me, but it is in the main a manifestation of economic and other factors of our national life.

Psychologists have been academic teachers and have naturally taken up problems concerned with children and schools. Other aspects of objective psychology to which these lead have been measurements of animal behavior. We are apparently somewhat behind Germany in the applications of psychology to industry, but we have a large development of industrial management and personnel work—the Taylor system is American—which will ultimately be taken over by official psychology. Even our swarms of cranks in the air above and our shoals of charlatans in the water beneath may be found to have contributed their bit, when natural selection and survival of the fit are given ample time.

It is not intended to discuss here the relative extent to which progress is due on the one side to great leaders, on the other to the activities of large numbers of individuals reacting to economic and other conditions. Neither is there any intention to undertake to define or delimit the field of psychology. Over a long period of years I have expressed opinions, incidentally or when an official address was required, some of which are quoted in the brochure that has been distributed; but such dicta—as also those that I am now perforce imposing upon you—are more analogous to a parlor game than to scientific research. The work at hand must be done; time will tell what part of it is useful and will survive. We can, as they say, " point with patriotic pride " to James, Hall, Royce, Dewey and Santayana as five writers on psychology, approaching it from the philosophical and literary side, but with full appreciation of scientific method, such as would be difficult to parallel in any other country. It seems, however, that the chief contribution of America to psychology has not been large philosophical generalizations, but the gradual accumulation from all sides of facts and methods that will ultimately create a science, both descriptive and applied, of human nature and human behavior. Each of us, as the English poet Clough says,

> must slave, a meager coral-worm,
> To build beneath the tide with excrement
> What one day will be island, or be reef,
> And will feed men, or wreck them.

II

The American Psychological Association was founded in 1892 on the initiative of Stanley Hall with 31 members; it now has 540 members and 353 associates; next year the total membership will be about 1,100. It is under the auspices of our Association, which covers the whole of North America, that this Congress is held. The officers and the national committee of the Congress were elected by a plebiscite vote of the membership of the Association, which has appropriated funds for the expenses and will publish the proceedings. It has merged its annual meeting with the Congress and the address of its president will be one of our principal functions. It owns—thanks to the generosity of Professor Warren—and conducts six psychological publications; at the last annual meeting in New York the registration of attendance was over 500. The Association may not be as useful as it should be and will be, but it is one of the most responsible American unions of scientific men and the world's greatest organization of psychologists. The growth of the Association, which closely parallels the increase in the number of American psychologists, is recorded in the table and shown in the curve which are printed in the brochure that has been placed in your hands.

The 31 members of the American Psychological Association in 1892 exhibit the position of psychology in America 37 years ago. The majority were not primarily psychologists. It may be that only four or five of the number were then actively engaged in psychological research and so continued. Of the presidents of the Association for the first sixteen years perhaps only Jastrow has remained faithful. During this period psychology was entangled with philosophy and parasitic on other sciences. Of the nineteen presidents of the Association since 1910, all but two are now actively engaged in psychological work, one of the two exceptions, Baird, having been so occupied at the time of his death.

In 1903 a census was taken of the psychologists of the United States. There were 313 who were judged to have contributed to the advancement of psychology, or, excluding those whose work was not primarily in psychology or in psychology combined with philosophy or education, there were 270. In that year the Psychological Association had 135 members. The number of psychologists had about quadrupled in eleven years. A study was at that time made of their origin, work and standing for the number of the *American Journal of Psychology* issued in honor of Stanley Hall.

In psychology and in each of eleven other sciences the workers were arranged by ten of their leading colleagues in the order of the value of their work, and the average positions determined. This order of merit method is an American contribution that has found wide application in educational psychology and in other directions. Philosophers are still included among the fifty leading psychologists, and as many as seven were or became university presidents; but in eleven years there had been a remarkable increase in the number of those professionally engaged in psychological work.

When scientific men were arranged in 1903 in order of merit it was stated that the lists would not be published within 20 years. Twenty-six years having now elapsed it may be useful in a historical survey to name the psychologists. The order gives no information concerning their contemporary position, several near the bottom having risen to the top and some at the top having dropped. A comparison of the standing of each psychologist after a period of twenty years has been made. This gives in quantitative units (with a probable error attached) his gain or loss in the judgment of his colleagues. The efforts of a lifetime are condensed into a single informing and dramatic figure. On the list in the brochure there is given the rank, which is the average position obtained from ten judgments, followed by its probable error.

The 200 competent psychologists of 1903 received their college degrees from 76 different institutions. The students then gathered in a small number of universities for graduate work; of 115 American doctorates 23 were conferred by Columbia, 22 by Cornell, 18 by Clark, 15 by Harvard and 11 by Yale; of 31 German doctorates 17 were from Leipzig. Practically all our psychologists were at that time engaged in teaching. Their relative productivity was found by counting the articles printed in or reviewed by the *Zeitschrift für Psychologie* in its first 25 volumes. Germany was far in the lead, partly owing to the source of the data. The number of experimental contributions from Germany, France and America was about the same. In theoretical papers we were about equal to England and far behind Germany and France; in physiological and pathological papers we were exceeded tenfold by Germany, threefold by Italy, France and England.

A further study of the distribution of American psychologists was made at the end of the year 1916 for an address given on the occasion of the twenty-fifth anniversary of the American Psychological Association. The members then numbered 307; more than 90 per cent of all psychologists of standing were found to be included. The psychologists of America had about doubled in number from 1903 to 1916, whereas they had about quadrupled from 1892 to 1903. Of the 307 members 272 were engaged in educational work in 121 different institutions. Sixteen were connected with boards of education, hospitals, charitable institutions, *etc.*, and it was at the time remarked that " this group, now so small, may at our fiftieth anniversary surpass in numbers those engaged in teaching." Eighty-four per cent of the number held the degree of doctor of philosophy, making psychologists the most academic of scientific workers, mathematicians and zoologists coming next with about 60 per cent. The American universities which conferred more than two of the 258 degrees were: Columbia 46, Harvard and Chicago 31, Clark 25, Cornell 24, Johns Hopkins and Yale 15, Pennsylvania 11, Iowa 6 and Michigan 4. The foreign universities were: Leipzig 15, Würzburg, Berlin and Freiburg 3.

The papers presented at the first 25 meetings of the association were classified by five-year periods. The percentage of experimental papers fell from 1892 to 1902; afterwards it increased slightly. The significant features of the curves are the great decrease in historical, philosophical, analytical and introspective papers, and the great increase in papers concerned with the measurement of individual differences in behavior. The time that psychologists reported themselves able to devote to research was found. Only 16 of the 215 who supplied the information devoted more than half their time to research; 149 of them less than a quarter. They are placed in three groups, in accordance with the value of their work. The largest group, ominously large, consists of those doing little or no research and standing lowest. Otherwise, there is scarcely any correlation between ability in research and time devoted to it.

In the twelve years since the celebration of the twenty-fifth anniversary of our association, it has grown from 307 members to 540 members and 353 associates, all of whom are or have been engaged in psychological work. Of the members only 12 do not have the degree of doctor of philosophy or its equivalent. The universities that have conferred the largest numbers of these degrees are Columbia 155, Chicago 91, Harvard 68, Clark 54, Iowa 42, Pennsylvania 41, Cornell 37, Johns Hopkins 34, Stanford and Yale 26, Washington and Minnesota 15. There are only four degrees from Leipzig, whereas there were 17 in 1903, with one fourth as many psychologists. The institutions from which the first degree was received are widely scattered and there seems to be no tendency for psychologists to be recruited from the institutions having strong graduate departments. I have found the center of productivity of scientific men to have moved westward from New England to the central states and onward to Iowa, Missouri and Nebraska. In the production of psychologists the universities of Indiana and Nebraska stand high.

The 893 psychologists hold positions in 339 different educational and other institutions. There are no fewer than 45 at Columbia, of whom 34 are members and 11 associates; Minnesota ranks next with 24, followed by Harvard, Pennsylvania, Yale, Chicago, Cornell, Stanford, Iowa, Ohio State, Michigan, New York and the Johns Hopkins, which are the institutions with which 10 or more psychologists are connected. In the two divisions of the University of California there are 17. The budgets of these universities show that, in spite of inadequate salaries, large sums are now spent on psychological teaching and research. Columbia appropriates nearly $200,000 annually for psychology, the budget of the university corporation being $69,200, of Teachers College $107,266, of Barnard College $18,800. Among the universities reporting, Ohio State stands next with costs of $114,771, followed by Stanford, Northwestern, Minnesota, Chicago, Michigan and Indiana, which are the universities having budgets in excess of $40,000. Seven institutions spend on psychology between $30,000 and $40,000, sixteen between $20,000 and $30,000, thirty-five between $10,000 and $20,000.

A table has been drawn up from the reports made by members of the Association on the subjects that they are teaching and the subjects with which they are engaged in research. Two or more subjects are usually given and the relevant fraction of the total time is distributed to each subject. Apart from " general " which refers mainly to teaching, " experimental " stands first, occupying the full time of the equivalent of 116.5 psychologists. " Educational," representing the time of 109.5 individuals, comes next, followed by " tests " and " clinical," 77.5 and 73.5, respectively. There then follow in decreasing order pathological, social, genetic, applied, theoretical, vocational, comparative, physiological, statistical and historical. The classes overlap, but the times are distributed among them as well as may be in accordance with the reports of those concerned. It is evident that the time of American psychologists is mainly devoted to work on individual differences by objective methods, educational work predominating. Curiously only one half of a psychologist confesses to the pursuit of psychoanalysis.

Professor Fernberger has counted up the publications recorded in the *Psychological Index* from 1894 to 1925 in accordance with the language used. For 1926 and 1927 the count has been continued, contributions from the United States and from Great Britain being separated. The curves are truly dramatic. For the first nine years at the end of the last century and the beginning of this, English, German and French contributions were very nearly equal in number, rising for each language from about 400 to about 800. There is then a remarkable increase in the German publications up to over 2,000 just before the war. The French publications drop to an average of about 400. The English publications remain nearly constant with a small increase. The disaster of war practically eliminated German and French publications. Owing to America, contributions in English rise with a drop for 1918. Germany has now regained its pre-war level, but French publications are fewer than 30 years ago.

France, Italy and Russia are close together, each with about 500 publications. The number of Russian contributions is notable. It should be remembered that variations in the curves are due to methods of indexing as well as to actual variation in the number of publications in a given year.

For publications in the year 1927 (including a few from the preceding year) I have made a subject as well as a language classification and have used also the German indices. In that year the distribution of titles according to the *Psychological Index* was: United States, 1,943, German, 1,509, British, 836, French, 553, Russian, 457, Italian, 449, all other, 71. The correspondence with the German indices is so close that I assume there is an exchange of titles such as I arranged when responsible for the American index. The distribution is as follows: United States, 1,966, German, 1,353, British, 775, French, 519, Russian, 480, Italian, 461, all other, 84. The total number of psychological publications recorded in our index is 5,798; in the German indices, 5,638.

In the subject-matter classification used in both the American and German publications what is called "mental development" stands first with 1,108 and 1,142 publications, respectively, recorded. Then follow "psychopathology" with 919 and 892, and "social functions" with 928 and 870. "Mental development" and "social functions" are not satisfactory terms; the publications refer largely to tests and educational psychology which are also included under other categories. There are recorded, respectively, 489 and 449 publications on sensation and perception, only 70 and 73 on feeling and emotion. The United States leads Germany in educational and comparative psychology; it is below Germany in psychopathology and "special (largely abnormal) conditions." We are also relatively below England and France in those subjects as in physiological psychology.

A table is also presented showing a classification of the contributions to psychology abstracted in *Psychological Abstracts* from its first issue in January, 1927, to the current issues for July, 1929. These number 9,383, approaching the number of titles recorded in the *Psychological Index*. The United States is in the lead with more publications abstracted than are listed by title in the index. These number 5,449, followed by German 1,549, British 836, French 811, Italian 218, Russian 149, other 371. That more than half of the 9,383 publications are American is doubtless due to the place of publication of the abstracts, but this will probably soon be the actual situation. The classification of titles is more satisfactory than in the case of the indices. Of 951 publications in educational psychology we are responsible for 797, with nearly the same predominance in tests and statistics as also in comparative, genetic and industrial psychology. In physiological and pathological psychology we are relatively much below Germany, England and France. The publications for 1927 abstracted or reviewed in *l'Année psychologique* have also been collated. The 1,166 publications are distributed as follows: American 371, French 365, German 249, British 83, Italian 40, Russian 21, other 37.

There were no women among the 31 original members of the American Psychological Association; two, Professor Calkins and Mrs. Ladd-Franklin, were elected at the second meeting. In 1917 there were 39 women, 13 per cent of the number. This was a larger proportion than in any other science, zoölogy coming next with 7.5 per cent, the percentages then decreasing to 2.1 for chemistry and 1.3 for physics and geology. There are now 242 women who are members or associates of the association, 27 per cent of the total membership. In but few fields of endeavor in which men were in complete control thirty-seven years ago have women made such large gains.

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Contrary to the usage of most foreign academies, our National Academy of Sciences, though it does not at present have members in economics, history or philology, includes psychology among the natural and exact sciences and has a section of anthropology and psychology. The National Research Council, which is a committee of the National Academy, has likewise a division of anthropology and psychology. The American Association for the Advancement of Science has a section of psychology; its section of education is largely concerned with psychological measurements. Reference should be made in passing to the organization of psychologists during the war by a committee of the American Psychological Association, the National Research Council of the National Academy and the American Association for the Advancement of Science under the leadership especially of Colonel Scott and Lieutenant-Colonel Yerkes. Most American psychologists became commissioned officers of the sanitary corps and took an active part in applying psychological methods. In a review of psychological organization mention should be made of the Psychological Corporation chartered in 1921 with 20 leading psychologists as directors and 170 members of the American Psychological Association as stockholders. The objects of the corporation are defined as the "advancement of psychology and the promotion of the useful applications of psychology." It aims to make the practice of psychology a profession and especially to conduct research of economic value on the lines of the industrial laboratories, which in America are rivaling the universities in their contribution to the advancement of science.

III

These remarks have been concerned with American psychologists, their distribution and organization, not with our contribution to the advancement of psychology, the briefest summary of which would require manyfold the time at my disposal. What we are doing in psychological research will be shown by the 360 papers and reports to be presented by American psychologists before this Congress. In a formal address before a scientific congress it may, however, be expected that the speaker will give some account of his own work. Perhaps the data concerning American psychologists may be regarded as such, for one of the developments of psychology in America has been the statistical study of groups of individuals. The main contribution of America to psychology has been the objective measurement of response to the situation without introspection and with special reference to individual differences and practical usefulness. It happens that experiments on effort, fatigue, learning and variation in performance, begun in 1886 and continued to the present time, have not been published, so reference may be made to them here as an example of the kind of work that I have tried to do.

Limits of time allow only a few words in regard to the raw data exhibited by the curves in the booklet that you hold. Perhaps this is not unfortunate, for it is a practical demonstration of the scientific method that I have followed. Theories assumed to explain the way people learn may be more interesting than crude facts, but theories are likely to become beds of Procrustes into which observations are fitted. Certainly we want laws in psychology; it would be most convenient if every one learned everything in the same way and this could be stated in a simple equation. But we are concerned with the real world in which we live; it is not the scientific man but the philosopher who hopes to see from his armchair a vision of monism seated in the lap of the absolute.

Perhaps a useful classification of individuals would be into those who ask " why " and those who ask " how and what for." Why people learn in the way they do is one question; how people learn, how they differ in the way they learn and what are the best ways to learn are different questions: these are the ones with which I am concerned. Acquired reflexes, so fruitfully investigated by Professor Pavlov—to-day our distinguished guest—of which on the sensori-motor side reaction times, reading and typewriting are typical, may be used as a theory to explain behavior, or they may be measured in order to obtain the most correct and economical description and in order to use this knowledge in useful ways. Thus, for example, the practice curve may prove to be an educational method of value. The student obtains an actual measure of comparative performance and progress much more correct than the opinion of a teacher. But the main advantage is that the competition of the student is not so much with others as with himself. The effort is not primarily to excel others, but to do better to-day than yesterday. It may also be noted that intensive effort for a short time is a better method of learning than dawdling for a longer time, and that making the measurements, correcting the errors and drawing the curves are excellent training. The practice curve method can be used with every school subject. Some references to other problems are made in connection with the curves that are exhibited and it is necessary to stop at that.

IV

International congresses are significant factors in the advancement of scientific research; they also promote international coöperation and good-will. The objects of the sciences are more ideal than the objects of the churches; their practices are more Christian. When in the fulness of time there is a family of the nations, when each will give according to its ability and receive according to its needs, when war among them will be as absurd as it would now be for members of this Congress to begin murdering one another, this will be due in no small measure to coöperation among scientific men of all nations in their common work. And it may be that psychology, the child among the sciences, and the United States, the child among the nations, shall lead them.

It is the object of psychology to describe, to understand and to control human conduct. The old philosophical distinctions between a positive and a normative science have faded in the light of increasing knowledge and common sense. If any one here holds that war is a blessing, it is not a matter for argument, but a case for confinement in a hospital for the insane. Within limits we know what we want and can use the methods of science to get it. Psychology, not less than other sciences, perhaps more than any one of them, is concerned with problems of human welfare. The nation, the family, schools, churches, courts, prisons, armies, navies—these are all institutions which aim by emotional and rule of thumb methods to alter individuals and to control their behavior. When we have knowledge and understanding concerning institutions and individuals and learn how to apply knowledge and understanding for their betterment, it will be the product of a science of psychology.

There may be worse ills on earth than wars, a more desirable good than friendship among the peoples of the world; but an international gathering is particularly concerned with these things. The Seventh International Congress of Psychology held at Oxford in 1923 was the first scientific congress after the war to which all nationals were invited on equal terms; we welcome to the present Congress with special pleasure psychologists from Soviet Russia. The United States has taken a Quaker engineer for its president; we have set up a symbol of peace and scientific progress in an industrial democracy. In the words given by our great poet to Columbus for his prayer to God, as " full of woe . . . a batter'd, wreck'd old man . . . he took his way along the island's edge ":

> Haply the swords I know may there indeed be turn'd to
>   reaping tools,
> Haply the lifeless cross I know, Europe's dead cross, may
>   bud and blossom there.

ESQUISSE HISTORIQUE DES CONGRÈS INTERNATIONAUX DE PSYCHOLOGIE

Remerciement au Nom des Congressistes Étrangers

Édouard Claparède

Secrétaire permanent du Comité international des Congrès

Au nom du Comité International des Congrès de Psychologie, et au nom de tous les Congressistes étrangers, je tiens à vous dire, Monsieur le Président de Yale University, combien nous sommes fiers que notre IXe Congrès soit réuni dans votre maison, l'une des plus célèbres Universités du monde, qui a justement comme Président un éminent psychologue. Nous vous remercions de l'accueil cordial que vous nous avez fait, et de vos paroles de bienvenue qui nous sont allés au coeur, et de votre princière hospitalité. Nous ne sommes pas moins fiers d'être présidés par un homme comme le Prof. Cattell, dont toute la carrière est un magnifique exemple de loyal travail et de dévouement à la science.

En vous adressant au nom de tous l'expression de notre profonde gratitude, je me sens poussé à m'écrier: Enfin! Enfin en Amérique!

Oui, Monsieur le Président, Mesdames et Messieurs, oui, enfin! Vous ne vous doutez peut-être pas que pour nous, psychologues du Vieux-Monde, la terre américaine flotte, depuis tantôt quarante ans, devant nos yeux, comme la Terre promise! Une Terre promise qui reculait toujours, au fur et à mesure que nous avancions, et que nous craignions bien n'atteindre jamais. Car, à chaque fois que nous reprenions le projet de vous rendre visite, des obstacles nouveaux surgissaient, obstacles personnels, obstacles politiques, enfin, depuis dix ans, obstacles économiques. Mais vous avez voulu aplanir pour nous ces derniers, et grâce à la générosité américaine, dont l'Europe a déjà si souvent récolté les fruits dorés, un bon contingent de nos troupes a pu traverser l'Océan.

Sans doute, nous n'avions pas besoin de venir ici pour savoir, chers Collègues américains, tout ce que la psychologie vous doit! Mais, pour que les âmes communient complètement, il faut parfois que les corps se rencontrent, que les mains se serrent. Merci à la Fondation Carnegie d'avoir résolu, à sa manière, le problème de l'âme et du corps, d'avoir compris que, pour créer cette âme internationale dont nous avons plus besoin que jamais, il fallait d'abord rapprocher les corps dans l'espace,—et d'avoir fourni libéralement le viatique indispensable à ce rapprochement.

Terre promise! Ne croyez pas, Messieurs, que ce sont là paroles de circonstance. Les sentiments qu'elles expriment reposent sur les faits. Voici 37 ans qu'au Congrès de Londres, en 1892, on avait proposé de réunir une session de notre Congrès aux États-Unis, en 1893. On avait même nommé une Commission composée de J. M. Baldwin, W. James, G. S. Hall, Fullerton, Donaldson, et Lightner Witmer, pour étudier ce voeu. Mais cette Commission a décidé, j'ignore pour quelles raisons, de n'y pas donner suite.

À Rome en 1905, W. James invita le Congrès à se réunir aux États-Unis. Mais lorsqu'il sut que son ami Flournoy avait invité le Congrès à venir à Genève, il retira sa proposition. Cependant les États-Unis reprirent leur invitation, et, à Genève en 1909, on décida de l'accepter et on nomma comme suit le Comité chargé de l'organisation du Congrès que nous pensions devoir être réuni en 1913: W. James, président d'honneur; J. M. Baldwin, président; Titchener et Cattell, vice-présidents; Sanford, secrétaire (qui, ayant refusé, fut remplacé par Watson).

Mais hélas, l'année suivante, W. James mourait, Baldwin quittait les États-Unis, et le Congrès fut ajourné. En 1914, c'était la guerre qui éclatait, séparant cruellement les hommes.

Lorsque la guerre fut terminée, celui qui vous parle songea à nos Congrès de Psychologie. Il ne pouvait pas n'y pas songer, car il avait été secrétaire général du Congrès de Genève, et, en cette qualité, il se trouvait avoir encore à la main le flambeau de nos Congrès, que les États-Unis devaient reprendre, mais qu'ils n'avaient pas repris. C'était à lui qu'incombait le devoir de renouer la chaîne brusquement interrompue. Or il ne pouvait être question, après la guerre, de s'adresser aux États-Unis, à cause de la crise des changes. Nos amis d'Angleterre acceptèrent alors de convoquer le Congrès à Oxford. Mais, à Oxford, on se souvint de la décision de Genève, et on proposa de nouveau les États-Unis. Encore une fois, cela ne put s'arranger. Mais, à Groningue, en 1926, un nouveau voeu fut exprimé, et cette fois, les conditions générales s'étant améliorées, l'American Psychological Association décida d'inviter le Congrès, ce dont nous lui exprimons ici toute notre gratitude.

Cette longue histoire vous montre, Mesdames et Messieurs, que " it is a long way to America ! "

À notre joie se mêle cependant un sentiment de mélancolie à la pensée que nous ne trouverons plus ici des hommes, des maîtres que nous estimions tant, les W. James, les Stanley Hall, Ladd, Sanford, Fullerton, Titchener et bien d'autres, auxquels hélas ! il faut ajouter Morton Prince, dont nous venons d'apprendre la mort, survenue à la veille même du Congrès.

Nous célébrons aujourd'hui le 40^{e} anniversaire des Congrès internationaux de Psychologie. À cette occasion, le Comité d'Organisation m'a demandé de retracer brièvement devant vous l'*historique* de nos Congrès.

C'est en 1881 qu'a germé pour la première fois dans le cerveau d'un psychologue l'idée d'un Congrès international de Psychologie. Ce psychologue était Ochorovicz, alors privat-docent à l'Université polonaise de Lemberg. Il la communiqua à Ribot, qui trouva cette entreprise " quelque peu chimérique " ! Vous voyez, Mesdames et Messieurs, comme les idées ont marché depuis un demi-siècle ! Toutefois Ribot ne refusa pas de publier cet appel chimérique dans la Revue philosophique de 1881 ; mais il ne l'appuya pas.

Cependant, en 1885, l'anthropologie criminelle réunit un premier Congrès international à Rome. Son succès encouragea le timide Ribot, et un premier Congrès international de Psychologie fut convoqué à *Paris* en 1889, à l'ombre de la Tour Eiffel, dont le squelette de fer présageait des temps nouveaux. Elle aussi avait jadis paru une entreprise chimérique!

Ce I^{er} Congrès fut un tout petit congrès, bien que sa liste de membres accuse 200 noms. Certainement il ne dut pas y en avoir la moitié aux séances. Il était placé sous la présidence de Charcot, mais celui-ci n'assista pas au Congrès, et ce fut Ribot, vice-président, qui le présida avec Charles Richet comme Secrétaire général.

À l'ordre du jour figuraient diverses questions alors d'actualité, et on pensait que le Congrès pourrait travailler à leur solution. Ces questions étaient les suivantes:

1. Le sens musculaire.
2. Rôle des mouvements dans la formation des images. "L'œuvre du Congrès," disait-on dans le programme, "consisterait à déterminer quels sont les éléments musculaires et tactiles qui font partie intégrante des diverses classes d'images."
3. Étude statistique des hallucinations. Il s'agissait de discuter les premiers résultats de l'enquête ouverte par la Society for Psychical Research de Londres, sur les hallucinations télépathiques.
4. L'attention est-elle toujours (selon la thèse de Ribot) déterminée par des états affectifs?
5. Hypnotisme. Une série de problèmes: L'aptitude à être hypnotisé; La différence entre le sommeil normal et le sommeil hypnotique; L'écriture automatique; Le transfert par les aimants; Les troubles de la personnalité; et enfin: Essai d'une terminologie dans le domaine de l'hypnotisme.
6. L'Hérédité. Préparation d'un questionnaire pour recueillir des documents indispensables à cette étude.

7, 8. Deux autres thèmes, qui ne furent pas traités pendant le Congrès: Les appétits chez les idiots et les imbéciles, et les poisons psychiques.

La Commission du Sens musculaire était présidée par W. James, celle de l'Hérédité, par Galton. Il est curieux de relire la discussion sur l'attention. Marillier soutenait contre Ribot qu'il pouvait y avoir attention sans état affectif. Toute la discussion fut extrêmement confuse, et l'on dut s'apercevoir déjà que, si les congrès ont cet intérêt de donner lieu à des entretiens animés, ils ne permettent guère d'aboutir à des conclusions précises!

La Section de l'Hypnotisme, présidée par Delbœuf, fut très active. C'était la grande période de l'hypnotisme. Il est curieux de voir que Babinski soutenait alors mordicus, contre l'école de la suggestion de Nancy, la réalité de l'état hypnotique. Notons le souci de mettre au point la terminologie de l'hypnotisme. À mon avis, ces questions de terminologie sont celles qu'il est le plus utile de mettre à l'ordre du jour des congrès.

Parmi les membres de ce I^{er} Congrès, nous notons : pour la France, outre Ribot et Richet, Beaunis, Pierre Janet, Binet, Gley, Marillier, Espinas, et de nombreux psychiâtres ou neurologues ; pour l'Allemagne, Schrenk-Notzing ; pour l'Angleterre, Sidgwick, Galton, Fred. W. H. Myers ; pour les États-Unis, W. James, Jastrow ; pour la Belgique, Delbœuf ; pour la Suisse, Aug. Forel et Flournoy. Enfin, Ochorovicz, l'initiateur de ce congrès, représentait la Pologne.

À la fin du Congrès, on discuta longtemps sur le titre à donner au Congrès. Celui de " Psychologie physiologique " paraissait trop étroit à beaucoup. On proposa " Psychologie expérimentale et comparée," puis " Psychologie expérimentale et d'observation." Finalement, " Psychologie expérimentale " finit par l'emporter.

C'est sous cette appellation qu'a été convoqué le II^{e} Congrès à *Londres* en 1892, sous la présidence de Sidgwick, avec Fred. W. H. Myers comme Secrétaire général : " Congress of Experimental Psychology." Cependant, ainsi que le disait le Président dans son discours inaugural : " England has, in fact, no properly equipped psychological laboratory. . . . I have hoped that the inevitable comparison of our position, not only with that of Germany, but also with that of our American cousins, who, with characteristic energy have developed eight or nine psychological laboratories in the last few years, would produce in our breasts a salutary humiliation, the precursor of amendment."

Le Congrès de Londres fut plus nombreux que le précédent : 300 membres. Bien qu'il fut organisé par deux des membres influents de la Société des recherches psychiques (Sidgwick et Myers), il ne fit aucune place aux questions dites " psychiques," c'est à dire plus ou moins occultes, à part le rapport sur l'enquête sur les hallucinations télépathiques, amorcée au précédent Congrès. Le quart des quarante-deux communications se rapporte à l'hypnotisme, un bon nombre aux localisations cérébrales—car c'était la grande époque des localisations—qui furent activement discutées par Horsley, Henschen, Ferrier, Schäfer, Hitzig, *etc.* Parmi les travaux psychologiques, relevons celui d'Alex. Bain sur l'introspection, de Lightner Witmer sur l'esthétique, de Ribot sur la nature des concepts, de Münsterberg sur les sentiments. Nous voyons apparaître la psychologie génétique avec Preyer qui parle de l'origine du nombre, et Baldwin qui retrace les commencements de la réaction volontaire. Citons encore les noms de J. Sully, Ll. Morgan, Galton, Ebbinghaus, Goldscheider, Martius, Pierre Janet, Heymans, Lehmann, Mourly Vold, W. James, Ladd-Franklin, Titchener, Warren. Helmholtz assista à quelques séances. Binet n'était pas venu à Londres, mais il avait envoyé un mémoire sur " les centres nerveux du vol chez les coléoptères "! Pourquoi co sujet bizarre? Cela s'explique si l'on se rappelle qu'à cette époque Binet, lic. en droit, préparait une thèse de doctorat ès sciences, et comme il était gendre du zoologiste Balbiani, il était naturel qu'il la préparât dans le laboratoire de son beau-père, qui lui avait donné pour sujet, " le système nerveux des insectes." C'est ainsi que les circonstances sociales éclairent parfois la psychologie individuelle.

Signalons encore un rapport sur l'audition colorée, par un Roumain, Ed. Gruber, qui déjà au Congrès de Paris avait proposé l'étude systématique de ce phénomène. J'ai eu l'occasion de voir souvent Gruber à Leipzig, où il préparait un doctorat, dans l'hiver 1892–93. Malheureusement, il est mort peu après son retour en Roumanie, et le grand ouvrage qui devait contenir le résultat détaillé de ses enquêtes n'a jamais paru.

Le III^e Congrès eut lieu à *Munich* en 1896, sous la présidence de Stumpf, avec Schrenk-Notzing comme Secrétaire général. Il fut fréquenté par 600 personnes, et il y eut 3 fois plus de communications qu'à Londres. Bien que celles relatives à l'hypnotisme représentent encore le 20% du total (à Paris, 33%, à Londres, 25%), on a l'impression que la psychologie prend conscience d'elle-même. L'anatomo-physiologie des centres nerveux ne donne plus que 2 à 3% des communications (contre

14% à Londres). C'est donc à juste titre qu'on a dénommé ce congrès " Congrès de Psychologie," tout court, en laissant tomber le mot " expérimentale." " Der schlichte Titel ' Congress für Psychologie ' sollte andeuten, dass jeder willkommen ist, der irgendwelche zur Psychologie in Beziehung stehende Tatsachen in einer für das psychologische Studium lehrreichen Weise mitteilt oder bespricht," affirma Stumpf dans son discours d'ouverture. Dans le même esprit libéral, il déclarait que le Congrès avait été ouvert aussi, comme les précédents, aux communications relevantes de l'occultisme, télépathie, *etc.,* car il ne fallait, dans ce domaine, rien préjuger à priori, et, lorsque des faits étaient avancés par des " savants respectables," on devait les soumettre au contrôle plutôt que de les passer sous silence.

La psychologie appliquée fit son apparition à ce congrès avec six communications de psychologie scolaire. L'une d'elles était due à Ebbinghaus, qui présentait sa fameuse *Combinationsmethode* pour la mesure de la fatigue des écoliers.

En parcourant les comptes rendus de ce congrès, on a le sentiment d'avoir quitté les temps préhistoriques! Nous y rencontrons beaucoup de noms de collègues qui sont encore en pleine activité: Sommer, P. Janet, Sollier, Sante de Sanctis, Patrizi, Ferrari, Aschaffenburg, Oskar Vogt, G. M. Stratton, et celui de W. Stern, ici présent, et qui pourrait, mieux que moi qui n'y avais pas assisté, vous donner des souvenirs vécus du Congrès de Munich.

Je ne donnerai donc aucun détail sur les communications présentées, je rappellerai seulement que c'est dans son discours d'ouverture que Stumpf défendit l'interactionisme, qu'il opposa au parallélisme psycho-physique.

Paris, 1900, IV^{e} Congrès, présidé par Ribot avec Janet comme Secrétaire général, et réuni dans l'un des palais de l'Exposition universelle. 475 membres, les communications montent à 164. La psychologie génétique n'est que peu représentée, la psychologie appliquée, pas du tout. On voit apparaître la psychologie religieuse et la psychologie animale, chacune avec trois communications.

Dans une conférence sur " la Psychologie maintenant et il y a cent ans," Ebbinghaus note que notre science, qui était encore soumise, au début du XIX^{e} siècle, aux influences nationales (la psychologie française, par exemple, de Condillac et de Bonnet, n'avait pas le moindre rapport avec celle de Leibnitz et de Wolff), s'en est affranchie aujourd'hui, à l'instar des autres sciences.

Rappelons que ce congrès subit un véritable assaut des occultistes de toute catégorie, spirites, théosophes, *etc.,* assaut qu'il fut impossible de repousser complètement. Flournoy, dans une magistrale conférence, avait défini l'attitude que la science expérimentale devait prendre à l'égard des phénomènes soi-disant supranormaux.

Le Congrès de *Rome,* en 1905, sous la présidence de Sergi, avec de Sanctis comme Secrétaire général, fut un grand congrès, comptant 475 membres, et agrémenté d'une série d'excursions et de festivités, qui permirent aux psychologues de faire ample connaissance les uns avec les autres. C'est à Rome, rappelons-le, que W. James fit en français, sa leçon retentissante " La conscience existe-t-elle ? " Je le vois encore, assis dans le vestibule du local du congrès, rédigeant, une demi-heure avant la séance, la conférence qu'il allait donner. Son cyclostyle courait sur le papier tenu sur ses genoux, et j'admirais sa rapidité de travail. " Je préfère écrire d'avance, me dit-il, n'étant pas assez sûr de mon français."

À Rome apparurent un grand nombre (près de 25%) de communications relatives à la psychologie sociale et criminelle : le voisinage de Lombroso, de Ferri, de Marro, de Niceforo et d'Ottolenghi se faisait sentir. Par contre, l'occultisme disparut complètement du programme, comme anéanti, asphyxié, par le positivisme intransigeant de la science italienne d'alors.

Et c'est ainsi que chaque Congrès a son individualité propre, qui fait son charme et sa valeur !

Mais le défaut de ce Congrès fut le trop grand nombre de communications annoncées : plus de 250 ! Il y avait pléthore. Une réaction s'imposait. Ferrari, l'un des secrétaires du congrès de Rome, fut le premier à la réclamer dans un article de revue.

Après Rome, *Genève!* Cette réforme qu'on réclamait, nous avons tenté de l'accomplir au VI^e Congrès qui se réunit, en 1909, dans la vieille cité des bords du Léman. Nous avons d'abord cherché, Flournoy et moi—Flournoy était président, moi-même Secrétaire général—à supprimer complètement les sections, pour laisser au congrès son unité. Nous pensions qu'aujourd'hui, où les périodiques se sont abondamment multipliés, les simples communications n'avaient plus d'objet, à moins qu'elles ne consistent en présentation d'appareils ou de projections, et qu'il fallait réserver les séances à des discussions sur des thèmes d'actualité préparés d'avance, ou à des travaux relatifs à des questions de terminologie, d'unification, *etc.* Nous mîmes donc à l'ordre du jour du congrès diverses questions alors d'actualité, comme le Subconscient, la Psychologie des Sentiments, la Psychologie religieuse, les Tropismes, avec rapports publiés d'avance, et dus à des hommes tels que Max Dessoir, Pierre Janet, Morton Prince, Höffding, Leuba, Külpe, Sollier, Loeb, Jennings, Bohn, Ferrari, Decroly, *etc.* En outre d'autres rapports avaient été préparés sur des questions de terminologie, d'étalonnage des couleurs, *etc.*

Ces rapports donnèrent lieu à de belles séances, avec discussions nourries, qui souvent (ainsi en ce qui concerne la psychologie religieuse) se poursuivirent longtemps, dans des séances spéciales, en plein air, pendant les promenades. La seule discussion sur la psychologie religieuse remplit quarante-cinq pages en petits caractères du Compte rendu du Congrès. Il faut dire que le Congrès de Genève avait réuni 600 membres.

Mais malheureusement, nous ne parvinmes pas à supprimer les communications individuelles. En dépit du désir exprimé dans notre circulaire d'invitation, de nombreuses personnes annoncèrent leur intention de parler; plusieurs déclarèrent qu'elles ne viendraient pas si elles ne pouvaient pas présenter une communication!

Ce " besoin de communiquer "—ce *Mitteilungstrieb,* comme diraient nos collègues allemands dans leur langue commode—pourrait donner lieu à de curieuses réflexions psychologiques. Faut-il y voir une sorte d'exhibitionnisme sublimé? Je me borne à l'enregistrer comme une tendance innée de l'individu, spécialement de l'individu du genre Congressiste.

Nous réussîmes cependant à faire tomber à quarante le nombre des communications individuelles.

Le Congrès de Genève se termina par une longue séance administrative dans laquelle on essaya d'établir une sorte de règlement des congrès; les uns demandèrent qu'il soit interdit de *lire* les communications; d'autres réclamèrent la disparition complète des communications individuelles. Et j'avoue que cette idée de congrès sans communications, de congrès qui ne seraient rien d'autre qu'une fête de l'amitié, ne manque pas d'être fort séduisante! On proposa aussi de limiter le nombre des congressistes, ainsi que la durée des communications. On recommanda de faire imprimer d'avance les rapports, comme cela s'était fait à Genève. Mais le Congrès ne prit aucune décision ferme, laissant à chaque nouveau Congrès le soin de s'organiser au mieux.

Le Congrès de Genève avait décidé, comme je l'ai dit, que la session suivante aurait lieu aux États-Unis. Mais la guerre vint et ce n'est qu'en 1923 que nous eûmes le plaisir—quoique, hélas, de quatorze ans plus vieux que la dernière fois—de nous retrouver à *Oxford,* sous la présidence de Charles S. Myers (avec W. Brown comme Secrétaire général). Réunion charmante, familiale, qui avait quelque chose d'intime, logés que nous étions dans les vieux bâtiments du New College, qui n'a de " New " que le nom, et prenant tous nos repas en commun. Réunion émouvante aussi, car c'était la première fois depuis la guerre que nous nous retrouvions tous ensemble, venant de tous les pays. Que l'on permette à un " neutre " de féliciter ici ses collègues d'Allemagne, de Belgique, de France, qui surent se tendre la main fraternellement, et ses collègues anglais qui surent créer l'atmosphère et le milieu propices à ce cordial rapprochement. Alors que, dans d'autres congrès soi-disant internationaux de cette époque, certaines nations étaient systématiquement exclues par les organisateurs, qui prolongeaient ainsi à plaisir le cauchemar de la guerre, notre Congrès de Psychologie fut vraiment international, et j'en suis fier pour les psychologues ! Comme le remarqua Pierre Janet dans son spirituel discours du banquet de clôture, les haines entre peuples représentent une prédominance des " conduites inférieures " sur les " conduites supérieures," prédominance qui est due à son tour à un abaissement de la tension psychologique, c'est à dire à une sorte de psychose relevant de la psychothérapie !

Oxford fut un congrès intime ; 240 participants seulement, et très peu de communications, quarante, dont treize étaient des rapports généraux imprimés à l'avance. Pour la première fois la psychologie industrielle apparaissait au programme.

Petit nombre de communications, longue durée du Congrès (huit jours), cela laissait beaucoup de temps libre, qui fut utilement employé à des séances particulières, les psychologues se groupant entr'eux selon leurs affinités, dans les petites chambres du New College. On constitua ainsi, en marge du Congrès, une Commission chargée d'entreprendre une enquête expérimentale sur les tests mentaux, chacun devant opérer selon un plan commun. Malheureusement, cette Commission n'a jamais poursuivi son travail. Décidément, le travail en commun, sur le plan international, est bien difficile !

Groningue, 1926, eut à peu près le même nombre de participants qu'Oxford. Sous la présidence d'Heymans (avec Roels comme Secrétaire général), ce VIII^e^ congrès fut très actif. Peut-être le programme était-il trop chargé, et il fallait en effet constamment restreindre les discussions. Les communications remontèrent à quatre-vingt-deux. Le caractère de ce Congrès fut la part relativement grande (13%) accordée aux questions doctrinales, comme la *verstehende* ou *l'erklärende* Psychologie. Je ne donne pas d'autres détails ; ce Congrès récent est encore présent à la mémoire de beaucoup de ceux qui m'écoutent.

Dès le II^e^ Congrès, en 1892, il fut nommé un " Comité international " permanent, chargé de patronner les congrès et de collaborer à leur organisation. Ce premier Comité comptait vingt-trois membres. Il fut remanié à Munich, et élevé à trente-huit membres. Paris porta ce nombre à cinquante-six, Rome à soixante-dix-sept. À Genève, on admit trente-cinq nouveaux membres, ce qui éleva le total à 108, car quatre décès s'étaient produits. À Oxford, on nomma vingt-quatre membres nouveaux; mais le total n'en resta pas moins stationnaire, car, de 1909 à 1923, vingt-six décès étaient enregistrés. Enfin, à Groningue, le Comité fut porté à 110 membres (onze nouveaux, neuf décès). Le nombre actuel, sauf erreur, est de 100.

Les membres de ce Comité international ont presque toujours été choisis parmi les psychologues assistants aux congrès, et en tenant autant que possible la balance égale entre les diverses nations.

Les fonctions de ce Comité international sont très modestes. Les membres de ce Comité présents à un Congrès se réunissent en séance officielle pour examiner les invitations reçues et pour donner leur préavis sur le choix du pays où aura lieu le Congrès suivant. En outre, en cas d'accident, de trouble quelconque au cours du Congrès, il est l'instance suprême à laquelle on peut recourir. À part cela, son rôle est purement décoratif. Mais il forme une sorte de lien qui rattache chaque session à la suivante, et assure ainsi la pérennité à notre institution des Congrès internationaux. Comme la substance germinative de Weissmann, il assure la continuité de sa vie à travers les générations successives, et en dépit des transformations incessantes que le cours des choses lui imprime, il lui confère l'identité substantielle, une personnalité propre.

Ce Comité international n'avait ni Président, ni Secrétaire. Mais l'expérience a montré qu'il pouvait être utile que quelqu'un le représente dans l'intervalle des Congrès, et puisse au besoin rappeler à qui de droit les décisions qu'il avait prises. Par exemple, après le Congrès d'Oxford, on m'avait chargé de rester en relations avec notre collègue Warren qui devait porter notre vœu en Amérique, et, en cas de refus, d'en avertir nos collègues hollandais. J'ai donc pensé qu'il serait utile, afin que des besognes de ce genre puissent être accomplies avec l'autorité nécessaire, de nommer un " Secrétaire permanent," et j'en ai fait la proposition au Congrès de Groningue. On m' a prié d'assumer cette fonction, mais je vous prie de croire que ce n'est pas dans cet espoir que je l'avais proposée! La seule démarche que, depuis lors, j'ai faite au nom du Comité international, ç'a été d'adresser, l'an dernier, un télégramme de bons vœux à M. Stumpf, président du III^e Congrès, à l'occasion de ses quatre-vingts ans.[1]

Il faut souhaiter d'ailleurs que ce nouveau rouage soit le plus superflu possible; je ne dis pas cela pour n'avoir rien à faire! mais parce qu'il n'a évidemment à entrer en jeu, tel le phénomène de conscience, que lorsque quelque chose ne va pas, lorsque la conduite est embarrassée.

Une question dont il faut que je dise un mot en terminant, car elle a préoccupé tous ceux qui ont eu à organiser un de nos Congrès, est celle des langues à admettre. Dans son plan de 1881, Ochorovicz demandait qu'il n'y eut qu'une seule langue, le français, et je crois bien que ce fut la seule employée à Paris en 1889. Mais il est inutile de dire qu'à Londres l'anglais et l'allemand apparurent, à Munich l'italien fut admis. À Genève, Oxford et Groningue, toutefois, il n'y eut pas de communications en italien, nos amis d'Italie ayant bien voulu s'exprimer en français, avec cette élégance qui les distingue.

Aujourd'hui, en vertu d'une décision du Comité international réuni à Groningue, les quatre langues sont admises officiellement (anglais, allemand, français, italien).

Cette multiplicité des langues, qui forme, à un certain point de vue, l'un des aspects pittoresques de notre pauvre humanité (qui est en train de s'uniformiser terriblement), et qui a encore l'avantage de poser de bien intéressants problèmes aux linguistes

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[1] Voici la réponse à ce télégramme:

Berlin-Lichterfelde, 27 4. 28

Sehr verehrter Herr Kollege,

Ihre freundlichen Glückwünsche zu meinem 80. Geburtstage im Namen des Comités für den Internationalen Psychologencongress haben mich sehr erfreut. Nehmen Sie besten Dank dafür. Möge das internationale Zusammenarbeiten der Psychologen allmählich wieder die frühere Höhe erreichen! Wie gerne denke ich noch an den grossen Münchener Kongress von 1896 zurück!

Mit den besten kollegialen Grüssen und Wünschen

Ihr ergebener
C. STUMPF

et aussi aux psychologues, constitue cependant, comme chacun sait, l'une des plus fortes entraves à la création de relations approfondies et intimes entre les ressortissants des diverses nations. Elle est une gêne perpétuelle pour toutes les assemblées internationales—nous le voyons bien à Genève lors de l'Assemblée des Nations—et en particulier pour nos Congrès de psychologie.

En attendant que l'*esperanto* soit suffisamment répandu—car je crois bien que, tôt ou tard, les hommes devront tous être capables, à côté de leur langue, de parler un idiome international, comme on parlait le latin au Moyen Age—m'est avis qu'on devrait dans nos congrès, laisser à chacun la liberté complète de parler la langue qu'il veut. C'est à chacun à escompter le nombre d'auditeurs qu'il risquera d'attirer en utilisant telle ou telle langue. Ce serait la solution libérale par excellence.

Puisque j'ai parlé de la question des langues, qui est une question brûlante dans les rapports internationaux, et la cause de nombreux conflits—les psychoanalystes ont essayé de nous apprendre pourquoi la langue maternelle est si intimement liée à tout notre système affectif—je voudrais en terminant rappeler quel rôle splendide pourraient jouer les psychologues, qui sont capables d'analyser et de comprendre le déterminisme de toutes ces mésententes qui enveniment les relations mutuelles des peuples. Nous vivons dans des temps difficiles, politiquement, socialement, économiquement. Or il n'y a pas de doute que beaucoup des maux dont nous souffrons proviennent de ce que nous usons encore de notions périmées qui ne répondent plus à la réalité objective du monde dans lequel nous vivons. Tout un réseau de relations internationales est tissé autour de notre Globe, et nous nous comportons cependant comme si chaque pays, perché sur sa souveraineté nationale, pouvait se suffire à soi-même. En termes biologiques, nous pouvons dire que nous souffrons d'un retard dans l'adaptation. Il est donc indispensable que s'effectue un réajustement des sentiments nationaux aux conditions créées par les innombrables interrelations des peuples.

Je pense que les psychologues peuvent faire beaucoup pour éclairer l'opinion publique, pour la guérir de sa dangereuse cécité psychique, pour lui montrer la source du malaise dont souffre notre génération, et lui indiquer le moyen de le combattre. Ce moyen, c'est la création de sentiments de solidarité mondiale d'un type absolument nouveau.

L'éclosion de tels sentiments, la façon de les susciter, constitue d'ailleurs pour la psychologie un problème passionnant.

Nos Congrès, certainement, sont un des instruments de cette grande œuvre, en créant entre les psychologues de toutes les régions du monde cette fraternelle solidarité qu'ils désirent voir exister entre les nations auxquelles ils appartiennent.

États-Unis—nom symbolique qui sonne comme un appel de clairon dans la mêlée confuse des peuples, comme un appel à cette union indispensable!

Puisse ce IX^e Congrès, réuni sous le signe des États-Unis, contribuer, dans la mesure de ses moyens, à l'avènement de l'ère nouvelle que nous souhaitons, de l'ère des *Nations unies!*

ADDRESS OF THE REPRESENTATIVE OF THE UNITED STATES GOVERNMENT

William John Cooper

United States Commissioner of Education

IN greeting you this morning it may be well to explain for the benefit of those members of this Congress who come from lands which acknowledge allegiance to a flag other than that of the United States that the Commissioner of Education of the United States exercises no administrative authority except in the Territory of Alaska where he is entrusted with the education and welfare of the native people. Frequently, however, the Commissioner does speak before gatherings interested in education and does attempt to explain American schools and general trends in American education. Very frequently indeed does he reflect or attempt to reflect the opinions of large groups of American educators.

One day last month while studying the work of the Bureau of Education in the Southeastern part of Alaska the Commissioner landed at the little village of Craig, a place none of you have ever heard of, I am sure, but a far, far western outpost where the United States War Department maintains a cable station. At that lonely station the Commissioner received one message. It was from his superior officer, the Secretary of the Interior directing him to appear at Yale University at this time and to extend the greetings of the Government of the United States and of the Secretary to you and to welcome especially those who have come to us from other lands. I enjoy, therefore, to-day the rather unique distinction of speaking both unofficially for American educators and officially for the United States Government.

We are very much interested in the work you are doing. We hope that we will profit much from the proceedings of this Congress. American schools prior to our Revolutionary War, even those which were supported by taxation, had a religious purpose. After the winning of our independence an objective mildly civic in character was suggested by some of our national leaders. Jefferson especially called attention to the fact that if the Nation expected to be both free and illiterate it expected what never had been and never could be. Literate citizenship came to be an accepted objective of the schools. After the close of our great Civil War in 1865 there appeared a decided tendency on the part of our schools to take on a nationalistic tone. Patriotic organizations induced State Legislatures to enact laws compelling the schools to teach United States history and government. In some cases the course of study found under these laws outlined the material to be taught in detail. With the development of organizations working for better world understanding and for the judicial settlement of international disputes there has been lessening of the curriculum emphasis upon teaching details of wars. American educators accordingly have turned more and more to the study of the individual child and the possibilities of his richest and fullest development. For success in this type of education the science of psychology is fundamental and we are eager for knowledge. You have come to us, therefore, at an important time. We appreciate your visit. We hope that your meeting may be all that you have hoped for. We want to help make your stay with us both pleasant and profitable. The Government of the United States wants you to make yourselves entirely at home here.

ABSTRACTS

OF ADDRESSES AND PAPERS

ABSTRACTS

LUTON ACKERSON. *On a Correlational Analysis of Children's Behavior Problems.*

Conduct and personality traits may be studied with reference to their interrelations and causal factors by means of the correlational techniques developed by the English biometricians, notably Galton and Pearson. The data of this study were obtained from the case records of a consecutive series of 5,000 children who have had a complete examination (physical, psychological, psychiatric, social, and recreational) at the Illinois Institute for Juvenile Research. The material has been placed upon Powers punch-cards for rapid mechanical sorting and counting to facilitate a systematic correlational analysis. About 140 frequently noted behavior traits were specially studied.

It is assumed in this inquiry that these traits are correlated with a large number of factors, either inherent in the child himself or arising in his environment, and that these correlations may vary in magnitude from zero to significantly high values either in a positive or negative direction. Thus the individual's behavior pattern is conceived as the resultant of many contributing factors of differing degrees of potency. The task of this investigation consisted in reducing to quantitative terms the degree of correlation or causal contribution.

Aberrations of conduct among boys showed their maximum frequency during ages 9 to 12. Problems of conduct among girls, and aberrations of personality among both sexes, increased irregularly with age, up to 17.9 years, beyond which the material is inadequate.

For children of both sexes, aged 5 to 12.9 years, the incidence of difficulties of conduct and personality increased markedly with rise in intelligence quotient up to at least 119 IQ, a point beyond which our data are insufficient. For the adolescent ages 13 to

17.9, the curves of incidence were arched in form, with maxima lying between 70 and 90 IQ.

If one may employ as measures of the extent of a child's behavioral deviation the fact of a police arrest (only a seventh of our cases have had a police contact), and the total numbers of difficulties of conduct and personality noted for each child, the relative seriousness or ominousness of separate behavioral aberrations may be indicated by their correlations with these three criteria.

A study of the intercorrelations among the traits themselves may show whether there exist certain constellations or syndromes or types among behavioral trends.

The correlations of behavioral difficulties with certain qualities of character and factors arising in the environment may indicate the relative causal importance of various traits or conditions.

HENRY F. ADAMS. *The Theory of Two Factors.*

Spearman's $r^2_{ag} = r_{ab} \cdot r_{ac} r_{bc}$. Whenever correction for attenuation gives 1.00, then $r_{ab} = (r_{aa} r_{bb})^{1/2}$, and similarly for the other terms. Substituting, $r^2_{ag} = r_{aa}$, *i.e.*, the reliability coefficient, if the test is devoid of systematic errors. When plotted, the result is an ogive curve which bisects the table diagonally. Since the value of r^2_{ag} is a function of the errors, and since the errors are a criterion of the difficulty of a test, then r^2_{ag} is an index of the difficulty of the test.

Since the curve mentioned above is a dividing line between the values of r^2_{ag} and $r^2_{as_a}$ the former values lying below and the latter above, then extracting the square roots of these values will give rise to two curves, one giving the r_{ag} values, the other those of r_{as_a}. Consequently, r_{ag} may be taken to be composed of two parts, one derived from r_{as_a} the other from r_{ag}. Are these Spearman's two factors? And is this his method of determining them? The application of his formulae to test results makes the assumption plausible.

Group factors may appear under at least two somewhat different conditions. Since group factors are represented by overlapping s's, and the s's in turn are functions of the errors, then the group factors will be due, in part at least, to overlapping or systematic errors. The second situation which may cause the appearance of group factors is found in the size of the percentage score received in the test. If the subject or group fail in more than one-half of the test items, the self-correlations (reliabilities) of the tests may be high but the accuracy correlations will be negative. In this situation, the accuracy correlations can no longer be the square roots of the self-correlations, as they should be, nor can r_{ag} and r^2_{ag} have the proper relations. The intercorrelations of tests can no longer be obtained by the use of the formula for correction for attenuation. Consequently, the tetrad difference criterion is no longer satisfied.

HENRY F. ADAMS. *Constant Errors in Tests.*

The writer suggested at the 1929 meetings of the American Psychological Association a technique for determining the objectivity ratio of scales of measurement. Subjectivity develops when errors constant for the individual, but not for the group, appear together with the random errors. The technique consists in determining self-consistency (r of first and second trials by the same person) and group-consistency (r between the trials of the different subjects). When the scale is objective, self-consistency = group-consistency. When the scale is subjective, self-consistency is greater than group-consistency.

Since that time it has been found that group-consistency is the square of the accuracy (r between the true criterion and the performance), no matter whether the scale is objective or subjective, so long as the scale is valid. With objective scales, self-consistency is also the square of the accuracy, but with subjective scales the relationship no longer holds, for the self-consistency rises, while group consistency and accuracy remain approximately constant. Since correlations between tests are self-correlations, it would follow necessarily that such correlations may be inflated by the constant errors inherent in subjective scales. Such inflation is greatest when the materials in the tests correlated are identical, and becomes less and less as the materials become more heterogeneous. Since most tests, as ordinarily administered, are more or less saturated with constant errors, the inflation becomes serious when tests are validated. Reliability coefficients are practically always higher than they should be. This becomes clear when one corrects for attenuation. The figure below the line is more highly inflated than the figure above the line in the formula, consequently the result is less than 1.00. Where constant errors are avoided, correction gives approximately 1.00. Consequently, a lower figure may be taken as a sign of an imperfectly objective test.

These sources of error may be avoided by discontinuing the use of self-correlations. This can be done by the following method. Obtain the accuracy correlations of the two tests to be correlated; obtain the mean value; square the mean value and this is the correlation between the tests. With discrimination material, the discrepancy between theory and practice is .005, with a probable error of the coefficients involved amounting to .009. With 438 correlations between tests, the discrepancy is .052, and the probable error of the coefficients involved is .054.

L. W. Allison, see J. Peterson.

Floyd H. Allport. *Motive as a Concept in Natural Science.*

For methodological purposes, with regard to the objects selected for scientific research, the following distinction may be found useful. We may distinguish between implicit, conceptual, or telic entities on the one hand and phenomena capable of explicit denotation and description upon the other. The former (implicit 'objects') are useful for determining limited laws upon one level only, and for applied purposes. The latter (explicit objects) have greater value for analytical natural science in that they admit of penetration to the more elementary levels and make possible the exploration and prediction of the unusual case, with the accompanying discovery of *wider* generalizations.

In the light of this distinction the concept of motivation, essentially an implicit and telic one, is examined in its various forms, as follows. (a) *Motive as present drive or energy-source.* This conception, which is anthropomorphic (a man within a man), disappears when explicit analysis is attempted. It gives a rough telic generalization, but no means of handling exceptions, since there is no penetration into the basis within the organism. (b) *Motive as an enduring drive arising from instinct and its modification.* The weakness of this notion is the fact that historical sequence as causation breaks down in the natural science approach for all purposes other than explanation, and secondly, that the explicit neural elements constituting 'instinct' are inextricably fused with 'learned' modifications. Furthermore, while the learning process as such follows certain laws, the *direction of habit differentiation* is unpredictable. (c) *Motive defined as outer stimulus or goal object.* In the sense of a 'but-for' condition of behavior this formulation may give roughly useful predictions. But one cannot penetrate beyond these 'correlations' to deal with exceptions or discover *basic* generalizations. (d) *Motive as activity-level habit.* This is a complicating intra-organic situation which demands analysis to the physiological level.

The conclusion is suggested that the attempt to isolate and measure qualitatively different motives, as determining factors, be abandoned except for telic purposes, and that attention be centered upon an analysis of objects explicitly denotable, such as glandular and other intra-organic tissue-states observed in relation to changes at the behavior level. In this way basic generalizations may be achieved, though admittedly with a loss of relevance for the telic aspect of the organism's adjustment.

GORDON W. ALLPORT. *What Is a Trait of Personality?*

It is proposed to rescue the term 'trait' from ambiguity, and with the aid of the following criteria to establish it as a serviceable and standard unit for the investigation of personality.

1. A trait has more than nominal existence.

2. A trait is more generalized than a habit.

3. A trait is dynamic.

4. The existence of a trait may be established empirically or statistically.

5. Traits are only relatively independent of each other.

6. A trait of personality, psychologically considered, has nothing to do with moral quality.

7. Acts or even habits, which are inconsistent with a trait, are not proof of the non-existence of the trait.

8. A trait may be viewed either in the light of the personality which contains it, or in the light of its distribution in the population at large.

John E. Anderson. *The Objects of Scientific Inquiry in Child Psychology.*

Within the last decade marked progress has been made in the field of child psychology, particularly as it concerns infants and young children. Two major systems, behaviorism and *Gestalt* psychology, have emphasized the genetic approach, from very different angles, each, however, with more basis in theory than concrete observations on children. Genetic psychology, because of a new and strong tide of experimentation, is rapidly moving from the descriptive and biographical stage, characteristic of early scientific inquiry, to the stages of measurement and experiment and of the precise formulation of general laws, characteristic of mature science.

Three major types of approach, differentiated on the basis of the direction or objects of inquiry rather than on the basis of method, may be described.

The first approach is characterized by an interest in the individual and the variations of the individual from such standards or conditions as may be set up. The object of study is the deviate rather than the mean, the individual rather than scientific law or principle. Historically this is the method that has dominated child psychology.

In the second approach, interest is primarily in underlying basic relations, which hold true of the group. The individual, whether he be animal, child, or adult, is the device through which such relations are to be demonstrated. The object of study is the mean rather than the deviate, the fundamental principle rather than the functioning unit. The more clearly the deviate disappears and the more clearly the relationship intrinsic to the group and the experimental setting appears, the better the scientific formulation. Interest in the practical during the process of formulation, is only incidental. Modern child psychology is tending more and more in this direction.

The third approach may be described in terms of the analysis of the wider relations of the principles demonstrated to function at any particular level of phenomena. It deals with the extrinsic relations of any particular formulation and may be likened to regression. This approach is concerned with the analysis of the range or extent of the operation of principles or laws, either phylogenetically or ontogenetically, and has as its object the developmental process in its widest biological relations. Only the beginning of an approach to this type of formulation has been made.

L. Dewey Anderson. *Test Reliability and the Probable Error Formula.*

Two tables of intercorrelations of twenty-six variables were studied to determine the accuracy of the formula for the probable error. One table consisted of the coefficients of correlation of test scores for the first giving of the tests, and the other those for the second giving. There were, therefore, two correlations representing the relationship of each pair of variables. In each case the difference in the size of the correlations was secured and converted into terms of the probable error of the first coefficient. The distributions of these variations of the probable error were compared to the curve of normal distribution. It was found that closeness of fit was dependent in large measure on the reliability of the test scores, *i.e.* the curves representing the probable error of coefficients using unreliable tests were characterized by a greater variability about the mean P.E. than those for the reliable tests. In general, the results indicated that, in the interpretation of tables of intercorrelations, test unreliability must be taken into account as well as the size of the population.

James R. Angell. *Address of Welcome to the Congress.* See pages 9–11.

Roswell P. Angier and Thomas W. Cook. *Binocular and Monocular Relations in Foveal Dark-Adaptation.*

Little systematic and technically adequate work has been done on foveal sensitivity to light during dark-adaptation, particularly with reference to binocular relationships. One reason, since foveal sensitivity increases rapidly during the first few seconds, is the difficulty of providing a quick transition from previous light-adaptation to the taking of thresholds in the initial stages of the subsequent dark-adaptation. Another is the difficulty of securing an adequate control of foveal fixation.

In this investigation a light-tight box, five feet long, was provided with head-rest, artificial pupils, each adjustable in three dimensions, and a white stimulus light, variable in gross intensity by interposition of milk glass screens, and in finer degrees of intensity by movement along a track. Light-adaptation was secured from two enclosed 300-watt Mazda daylight lamps, to the right and left, respectively, illuminating magnesium oxide surfaces which, by appropriate angular adjustment, reflected the light to a central retinal area subtending a visual angle of 5.25°. The field of the stimulus (threshold) light subtended an angle of 0.916°. All lamps were carefully calibrated, and controlled for constancy. Foveal fixation was ensured by four small, triangular spots of luminous paint arranged about each stimulus field so that the tips of the triangles were just visible in accurate foveal fixation. An eye-movement of 0.75° altered either the number of spots visible or their relative brightness. After the eye had been light adapted, a simple lever device enabled the experimenter simultaneously to extinguish the adaptation lamps, to remove the adaptation field from the line of vision, and to set the stimulus light for threshold taking. The first threshold was obtainable within five or six seconds after the onset of dark-adaptation. The period of previous light-adaptation was either one or three minutes.

Recorded data show: (1) the initial drop in the threshold curve in dark-adaptation is rapid for the first thirty seconds, gradually slowing up; (2) for some subjects successively lower thresholds were obtained up to 60 sec., for others up to only 25 sec.; (3) prior binocular light-adaptation gave lower *monocular* dark-adaptation thresholds than monocular light-adaptation gave; (4) the average monocular threshold after binocular light-adaptation was for three subjects 50 per cent higher than for binocular thresholds—a distinct evidence of foveal binocular summation.

The last three results seem to be new data. The third point indicates that, with monocular threshold determination, prior light-adaptation of the other eye increases the retinal sensitivity of the observing eye under dark-adaptation.

ADA HART ARLITT. *Atypical Behavior and Reactions to Punishment in Early Childhood.*

Legal punishment appears to be based on the idea that it will produce similar responses no matter to whom it is administered. The reactions of individuals, even in early childhood, indicate that individual differences are as apparent in the field of reaction to punishment as in all other fields. Certain atypical reactions serve to make this point doubly clear.

Child *A,* observed over a period of two years from the time he was two until he was four, at no time would acknowledge that he had been punished. He claimed on each occasion that the punishments were the things desired, no matter how varied the punishments were.

A second case used punishment as something about which to boast, and a third apparently gave no results in response to punishment, but could be moved by methods which gained his coöperation.

Ada Hart Arlitt and Wilma Lloyd. *Hospitalization as a Factor in Producing Behavior Problems.*

The purpose of this study was fourfold. (1) What problems are presented by the hospitalized child? (2) At what ages do these problems occur? (3) What effect do hospital care and routine have on the problem child? (4) What relation, if any, exists between the child's physical condition and type of behavioral problem presented?

The subjects for this study were 625 pre-school age children, the total pre-school age population of a children's hospital from September, 1927, to June, 1928. The type of problem presented by each child was listed and a study was made of the case history of each child before entering the hospital.

Forty-five children were studied intensively. In the case of each problem child, the case history and statement of problem was checked up by observation of the behavior of this child by the experimenter.

The conclusions were as follows.

(1) A wide range of problems was found. This range includes temper tantrums, enuresis, feeding cases, fears, apathy, nervous habits, exhibitionism, hyper-activity, negativism, sullenness, extreme shyness, desire for attention, over-dependence, skataphilia, cruelty, speech defects, and irritability.

(2) The most common problems were temper tantrums, feeding cases, enuresis, fears, and apathy, in the order listed. This list includes 63 per cent of the total incidence of problems.

(3) There was a definite relation between the age of the child and the type of problem presented.

(4) Physical condition appeared to play a large part in the development of behavior problems studied. Of the forty-five cases studied intensively, eighteen were closely associated with physical disturbances. The same relation appears to hold true of the total number of cases.

(5) It was found that the hospital successfully deals with the simple problems of temper tantrums, feeding cases, desire for attention, and enuresis. The regular routine of hospital life,

together with unremitting care in training, is effective reconditioning children showing these problems. Instruction is given to the parents in order that the new habits may not be lost when the child returns to his home environment.

(6) While hospitalization is effective in reconditioning some types of problem children, it gives rise to certain behavioral difficulties. These include problems of hyper-activity, due to lack of sufficient outlets for surplus energy; problems of irritability, due to lack of constructive occupation; problems of exhibitionism due to overmuch attention.

F. AVELING. *The Psychogalvanic Phenomenon.*

The psychogalvanic phenomenon is a physical event immediately indicative (according to the method employed) of any alteration of resistance, or of potential, between several epidermal points. In order to determine its *psychological* significance, it is not necessary to investigate the precise nature of the physiological changes concerned in the reflex, since correlation can be worked out by noting the occurrence and magnitude of the phenomenon in the presence or absence of mental events introspectively reported. On the basis of any one of the psychophysical theories, whatever the physiological changes may be, the reflex will presumably tend to 'go with' one (or several) mental experiences of differing modality.

On this supposition, it is claimed that the phenomenon is indicative of conation, and for the following reasons.

1. In most of the work upon the reflex to date the mental phenomena have been observed *in globo.* Distinctions have not been regularly drawn between their various aspects; and in particular between the conative and affective aspects of orectic process. The phenomenon has accordingly been attributed to emotional states without further analysis. As a matter of fact, however, the reflex occurs in the absence of introspectible emotion.

2. The time element in the sequence of events has not usually been adequately considered. If the James-Lange view gives a true (or even only partially true) account of emotion, the reflex

must occur antecedently to experience of the emotion. The latter accordingly cannot be its cause; but is the effect of whatever causes the reflex itself. During the latent period of the reflex (from apprehension of the stimulus to swing of the galvanometer) perception and adjustment of attitude (conation) occur; but it has yet to be shown that there occurs anything of the nature of emotion.

3. In early experimental work in our laboratory (on choice) the reflex was found to occur in the absence of experienced emotion, but in connection with experience introspectively reported as 'alertness' (Thouless' "preparedness to react to a stimulus"). This is a conative phenomenon, a mental 'set.' Moreover, introspective reports of the amount of 'alertness' experienced, made without knowledge of the galvanometric registrations, correlated well with these latter.

4. In a second research (on measurement of conation) in which subjects were required to react against pre-formed dispositions, as in the experiments of Ach, analysis of the protocols for reported experiences of all kinds showed that conative ones correlated with the percentage decreases in resistance indicated by the galvanometer curves.

5. In a third research (on judgment) it was again shown that the reflex correlated with conation rather than with emotion. Indeed, anything of the nature of emotion was most rarely reported. It was further shown that conation is manifested with reproductive rather than with educative processes (which latter need no trying); and an indication was given that volition and conation are to be distinguished both introspectively and by means of the psychogalvanic reflex.

6. The last-mentioned point was taken up, corroborated and extended by Mr. Bartlett and me in a special investigation, the results of which were communicated to the VIIIth International Congress of Psychology at Groningen.

7. A research (on conative control) evidenced the fact that sensory effort is distinguishable from an active, non-sensory, conative factor. Further evidence was secured in this work that the reflex correlates with conation.

8. A research (on the subjective character of cognition) revealed the same facts. A formidable number of protocols were analysed in respect of all aspects of consciousness reported (cognition, affection and conation) ; and were marked accordingly. The amounts of the deflections were shared between the aspects so reported.

9. The foregoing research also corroborated a previous one in which estimates of character-qualities in children, made by their teachers, were correlated with the deflections of the reflex observed in connection with nocive and other stimuli. In that research it was found that the deflections in magnitude correlate with the estimates of " force of character," " desire to excel," " rapidity of decision," *etc.;* all of which are conative (or volitional) characters.

F. AVELING. *The Perception of Tachistoscopically Exposed Symbols.*

ENGLISH BAGBY. *Assimilation, Sublimation, and Repression.*

It is entirely possible that all varieties of psychopathic conditions involve nothing more than the functioning of processes already identified through experimental research. In the case of a particular patient to be described, what appears to be a rather complex psychopathology, is capable of very simple analysis.

A Mood of Fear. Encountering a particularly difficult life situation which has induced fear, the individual exhibits trial-and-error conduct which does not serve to eliminate the fear mood. In fact, the conduct actually serves only to augment and maintain the mood of uneasiness. This is effected through a circular reflex type of reaction, involving the visceral emotional condition and the thinking activities.

Assimilation. If the individual should succeed in organizing thinking habits that will afford a solution to his problem (*i.e.* eliminate his fear), he could be said to have exhibited a process of assimilation.

Repression. As an alternative to assimilation, the individual can engage in distraction activities which will inhibit the thinking component of his fear mood. These distractions will terminate his mood for brief intervals, and this is called repression. When the problem again arises, the distraction activities will immediately reappear, the problem, however, remaining unsolved.

Sublimation. As processes, sublimation and repression may be regarded as identical. We speak of a process as repression when the problem should be met and can be solved. Sublimation, on the other hand, is a healthy reaction to situations which do not permit of a solution through the thinking of the patient.

JOSEPHINE BALL. *The Effect of a Diet Deficient in Vitamin E on Sex Behavior of Male Rats.*

Withdrawing vitamin E from the diet of male rats from the time of weaning produces a slow degeneration of the seminiferous tubules of the testes after an initial period of fertility. Interstitial tissue is normal throughout.[1]

The same histological picture is shown under several experimental conditions except that in deficiency in vitamin E, degeneration is much slower. The more rapid degeneration has been extensively used in the attempt to determine the part played by the seminiferous tubules and interstitial tissue in producing the sex hormone. It was thought that old rats raised on the deficient diet showed one indication of lack of this hormone, *i.e.* they lacked sex interest. The present study was an attempt to ascertain this with statistical validity and to determine whether or not it was due to lack of the vitamin and to tubule degeneration.

The following groups of litter-mate brothers were studied.

GROUP	DIET
I	Extracted foods free from vitamin E.
II	Extracted foods with vitamin E in the form of wheat germ oil.
III	Natural foods. Testes experimentally retained in abdomen.
IV	Natural foods. Controls.
V	Natural foods. Laparotomy controls for group III.

Nearly 2,000 observations were made at different stages of tubule atrophy. Each observation consisted of recording number of ejaculations, number of copulatory attempts, time of ejaculation and time of subsequent resumption of activity, during the first two hours the male was with a receptive female.

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[1] This work was done in collaboration with Dr. Herbert M. Evans in the Department of Anatomy, University of California.

These records make possible some statistical descriptions of normal sex behavior in the male rat concerning such factors as normal ranges of variation, relation of activity to variability, time of night of greatest activity, most profitable frequency and length of testing, *etc.*

No changes in sex behavior were observed until the tests made when the rats were 15–17 months old. At this time all groups were the same except the E-free rats which appeared to be almost devoid of sex interest. They were also seriously underweight and showed other symptoms of poor general condition; but the testicular atrophy was less severe than that of the cryptorchid animals.

It is to be concluded that the lack of sex activity, therefore, is not due to loss of germinal epithelium but to some more general pathological condition. It also seems safe to conclude that very severe tubule degeneration does not affect sex behavior in rats.

S. H. Bartley and Harry Helson. *A Modified Kinohapt.*

In order to embody several desirable features of stability, simplicity, rapid adjustment, wide range of spatial and temporal adaptability and precision, we have constructed a kinohapt patterned after and modified from the instruments described by Benussi and Dallenbach. Its essential parts consist of the base, three heavy upright rod supports, the general carriage with three individual carriages carrying the stimulus points controlled by solenoids within which they move. The arm is placed under the general carriage in a plaster cast. The general carriage (as well as the individual carriages) is separately variable in the three dimensions of space. The stimulus points may be applied to within 5 mm. of each other or at distances of several centimeters.

The necessary stability of the instrument and the movable parts is assured by the use of heavy vertical slide-rods set in a heavy oak base. Attached to this base, opposite the two rods is a third rod of the same size which serves to stabilize the end of the carriage support. Longitudinal and cross adjustments are made by means of rack and pinion, while vertical adjustments are made by means of a screw device turned by a small crank. The heavy materials used, and the rack and pinion and worm-gears, as well as locking devices, help to insure rigidity of all the parts, even during use, so that, once an adjustment is made, several stimulations can be made without great error.

Stimuli can be applied at either small or large distances on the forearm, wrist, or hand. Except for their movement in approaching and leaving the skin the stimulus points can be rigidly controlled. Distance between points can be measured directly or from the places actually touched on the skin. The points are made to fall upon the skin when the current actuating the solenoids is broken and to leave the skin when it is made. The constant error due to lag is about 35σ. The temporal intervals between the stimuli are controlled by means of a rotating metal disk upon which cardboard has been pasted and sectors cut out, thus allowing any desired time for the makes and breaks of current which goes through the disk to contact points in circuit with the solenoids. Intervals as short as 5σ are possible, or stimuli may be made to overlap (zero interval) when wanted. In order that the points may stay in place during the time between trials a shunt is placed across the circuit leading to the timer.

T. L. Bayne, A. L. Winsor and E. S. Winters. *Conditioned Motor Responses in Children.*

Pavlov's researches[1] upon the activities of the cerebral hemispheres in the dog have inspired a number of workers to employ his method of the conditioned reflex in the study of human behavior. Outstanding among these workers are Krasnogorsky and Ivanov-Smolensky. In most of his work with children Krasnogorsky uses the motor response of the opening of the mouth to receive a bit of candy, forming associations between this response and various stimuli, *e.g.* the beat of a metronome.[2] Ivanov-Smolensky uses the motor response of squeezing a rubber bulb which operates a shutter, the shutter allowing a piece of candy to fall into a tray from which the child recovers it.[3]

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[1] I. N. Pavlov, Conditioned Reflexes, 1927.

Using Ivanov-Smolensky's apparatus, we have begun a study of the behavior of children by the method of conditioned responses. We have established in two 6-year-old children conditioned motor responses to 3 different stimuli, the beat of a metronome, the sound of an ordinary buzzer and the flash of a small red light. Eight or 10 joint stimulations with the metronome (buzzer or light) and the candy were sufficient to establish a conditioned response. After the joint stimulations, when the metronome (buzzer or light) alone was presented, the child would squeeze the rubber bulb. A much larger number (200–300) of joint stimulations were required to establish a conditioned response to the metronome in a 4-year-old child. The development of the conditioned response in the 4-year-old was inhibited (Pavlov's "external inhibition") by her responses to various stimuli, objects in the laboratory at which she looked or nearby parts of the apparatus which she handled. No doubt, other factors would explain, in part, her failure to become conditioned sooner.

WILLIS CARTER BEASLEY. *Demonstration of the Tone Phaser.*

The phaser is a special type of tone generator to be used in experimental problems and class demonstrations where it is desired to control accurately the frequency ratios of two or more primaries in a compound sound and the phase relations of these primaries. From two to twelve primaries may be combined simultaneously, with any desired frequency ratios, relative amplitudes and phase relations. Either telephone or loud speaker reproduction may be used. With this instrument a binaural phase difference of the same sound may be controlled accurately to a known extent or a phase change between the primaries in a compound stimulating either one or both ears may be accomplished.

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[2] N. Krasnogorsky, Amer. J. Dis. Child., 1925, 753.
[3] A. G. Ivanov-Smolensky, Brain, 1927, L. 139.

The instrument consists essentially of a series of toothed wheels mounted on the same shaft, driven by either a constant or variable speed motor. Above each wheel is mounted a bi-polar telephone receiver magnet. The teeth of the wheel are milled to fit the inter-polar distances of the poles in the magnetic field. The relative number of teeth on the wheel determine the frequency ratios of the generated currents, and the absolute number of teeth, together with the actual speed of the common shaft, determine the absolute frequency of any particular alternating current. By maintaining certain of the magnets stationary, and rotating others by means of auxiliary constant speed motors, the change of phase relations between the A.C. currents is effected.

The construction of this instrument appears highly important for the investigation of certain auditory phenomena which have never been adequately investigated before. Recent experimentation with the phaser has demonstrated, for example, that we can discriminate changes in the relative loudness of the partial components of a compound sound as the phase relations of the primaries are slowly altered. This discovery is of considerable importance for auditory theory, since it has been long maintained that the ear cannot make such discriminations—a tenet which was held to support the various resonance theories of audition.

J. CARLETON BELL. *Contributions of Psychology to Secondary Education.*

1. A study of the learning process shows that all learning develops from within. Nothing can be taken on or poured in from without. Even the acquisition of information is a growth from within. True, such development takes place under the influence of external stimuli, and may be vivid or vague in accordance with the way the stimuli are supplied, but the internal nature of the process is paramount.

2. It is the function of the teacher, then, to study the learner carefully and to apply the stimuli of textbooks, observations, talks and questions in such a way as to develop the maximum of learning effect.

3. From this has come the recognition of the need for specific learning techniques. These vary with the individual learner and with the type of material to be learned, and involve the integration of complicated systems of habits (*e.g.* learning to read a foreign language fluently, or to attack typical problems in algebra).

4. In order to foster learning successfully we should know the nature of the learner and the habits he has already formed. The past ten years have been prolific in the development of tests of capacity and attainments, but further tests are needed, and more careful determination of their reliability is imperative.

5. Another promising step is the organization of subject matter into learning units. The experimental determination of the most satisfactory learning units and their articulation with each other will be an important factor in the development of scientific methodology.

6. A study of learners' mistakes in each phase of each subject throws much light on the learning process. Each mistake means a wrong association to be broken down and a correct one to be formed in its place. It is only by an intensive study of the nature and causes of these mistakes that we may help the learner build up suitable responses.

MADISON BENTLEY. *The Nature of Experiment in Psychology.*

Recent extensions within the field of psychology and the importation to it of new methods of research have greatly modified the character of experimentation. The change is chiefly due to new uses of clinical, statistical and comparative methods. The general result is that the term 'experimental psychology' is much less precise and much more ambiguous than it was twenty-five years ago. It is important, therefore, that the conditions and procedures essential to experiment should again be reviewed. We may also fruitfully inquire whether the special character of psychological objects and processes creates a necessary distinction between our own experimental procedures and those of the biological and physical sciences.

J. Beritoff. *Physiology of the Individually Acquired Acts of Animal Behavior.*

We are investigating fundamental physiological processes that condition the individually acquired acts of animal behavior (of a dog) in connection with complex stimulation within certain experimental surroundings. For this purpose the dog is trained to go from its usual start to the food-box at a complex sound signal, and we study the rôle of the complex signal and of its parts, as well as all special conditions of the experiment.

When the indifferent complex stimulation coincides with the movement of the dog towards the food-box, and with the feeding itself, the learned or individual movements of the dog to the food-box are first evoked, not only by the given signal, but also by each component part, and the combinations of these components (stage of generalization of the reflex).

Later the given act of behavior is produced only by the complex; the components as well as their combinations do not evoke it (stage of differentiation of the reflex). Complete differentiation is not reached at once. First the physiologically weak components cease to give individual reflexes, and then the strong components, and finally their combinations.

If we combine each component part, with the movement to the food-box and the feeding itself, while we do not combine the complex, the components as well as the complex evoke at the beginning the same individual movements and later, after several trials of the complex without performing feeding, it (the complex) ceases to evoke such individual movements.

Not only special individual signals but also various conditions of the experiment, *i.e.* the aspect of the place of start and of the food-box, the presence of the experimenter, the position of the animal at the moment of the signal, *etc.,* play an essential part in conditioning the dog's behavior, viz., its movement from the start to the food-box, its stay at the latter, its coming back to the place of start, and its stay at the start during intervals between signals.

On the basis of an experimental analysis it is established that each individually acquired act of behavior in all cases is determined by combining together the reflex actions of components of the special signal as well as all environmental factors. The appearance or non-appearance of an individual act of behavior is a result of the activity of those progressive and regressive temporary connections which are developed primarily between all cortical elements receiving peripheral stimulations during the experiment, and secondarily between these cortical elements and motor areas of the cortex through which all individual movements of the dog are produced.

HARIDAS BHATTACHARYYA. *The Psychology of Post-Mortem Existence.*

Imagination, wish and experience supply the three-fold basis of belief in post-mortem existence.

I. Ancient thought imagined the persistence of the recent dead as separate personalities near the homestead or in tombs, and arranged for their customary comforts by burying or burning objects of material enjoyment or by symbolic gifts. When contemplated with fear these became ghosts, and propitiatory offerings were made to keep them in health and good humor. When reverently regarded, they became gods and ancestor worship was instituted. The dead of ages long past simply became the fathers and their separate graves were fused into a land of shades. Sometimes the ages, occupations and relationships of earthly life were transferred to this world. With the dawning of moral sense, heavens and hells, corresponding to different merits and demerits, were constructed. Association with heavenly bodies and cremation suggested an empyrean constitution of heaven and the declining march of the sun its western location. Gradation in merit was correlated with height so that while God was in the highest heaven the Arch-sinner was bound in the lowest hell. Ideas of kingly majesty introduced lesser divinities with diverse functions and hallelujahs replaced court panegyrics. For those of mixed merit temporary residence in heaven followed by fall, direct transmigration, or an intermediate region was proposed. The psychical research movement prescribes attenuated spatial persistence for all. Dissolution of body in death suggests celibacy and mortification as preparations. Belief in bodily resurrection provides for ascension.

II. The principle of wish-fulfilment either negatively describes heaven as painless, changeless, *etc.,* or positively characterizes it as eternal and blissful. When immaterially conceived, heaven becomes free from spatial and temporal limitations and filled with joyous spirits of youthful age. When grossly conceived, gold and precious stones, fruit-bearing trees and cool rivers, nectar and manna, make their appearance, and provision is made for sexual enjoyment without the attendant troubles of childbirth. Space contracts according to desire and affinity, and gravitation is unknown. The self-preservative instinct dictates personal survival in some form. The social instinct demands socially sanctified disposal of the corpse and customary social contact beyond. Adherents of other faiths and apostates are barred out.

III. The experience of human weakness introduces the conception of a mediator interceding and suffering for erring mortals, abolishes eternal hell, and provides for the operation of divine grace out of proportion to human merit. A strict sense of justice leaves the sinner to his fate or at most provides for transmigration, purgation, moral progress, or gradual liberation. The sense of personal transcendence in ecstasy sanctifies debased practices and cataleptic feats. The sense of exaltation equates salvation with angelic status. The sense of world weariness negatively and those of unity, peace, harmony, overpowering presence, and expanding cosmopolitanism positively, prompt conceptions of absorption in God and nirvana. The rare moments of mental calm, peace, and joy in spiritual experience are regarded as inklings of heavenly bliss. But such feelings bring salvation down below and place the kingdom of God within the mind and not beyond the stars.

The objectivity of post-mortem existence is established by none of these factors.

Arthur G. Bills. *Tension in Learning and Association.*

Results already reported show that a condition of muscular tension during the learning of nonsense syllables and words tends to shorten learning time and increase retention. The following research brings out the effect of tension (a) on stylus-maze learning and (b) on free and controlled associational processes.

Tension in maze learning. By means of a specially constructed stylus, sensitive to both vertical and horizontal pressure of the fingers, with kymographic recording devices, record was kept of the hand and arm tension of the subjects in learning the maze. Another device, consisting of sensitive cones resting on the jaw muscles, recorded jaw tension. The subjects were set to learn (a) a maze in which the difficult part was concentrated in a limited area; (b) a pair of mazes, one easy, one difficult; (c) two mazes of equal difficulty, one of which was solved under dynamometer tension, the other without.

The following questions were answered. (1) Is tension more in evidence in learning difficult parts of mazes, and does it play a greater rôle in learning difficult mazes? (2) Does it appear more in the early or late stages of learning? (3) Do individuals who are good maze learners, in terms of trials, errors, and time, use more or less tension than poor learners? (4) When the subject deliberately increases his tension, does it benefit or hinder his maze learning efficiency? In general, it was found that the subjects who used most tension learned most rapidly, and had fewest errors. Highly variable pressure accompanied high error scores, and errors were most frequent at points where tension fluctuated most. The greatest pressure occurred during the running of the difficult part of the maze, and during the initial stages of learning. Voluntary tension reduced both time and errors in maze learning.

Tension in associational processes. Two sorts of association were studied: free associational responses as illustrated by the Kent-Rosanoff list, and semi-controlled associational responses, such as the giving of as many pairs of opposites, or as many adjective modifiers of a noun, *etc.,* as possible in three minutes. Tension was secured by pressure on hand dynamometers. It was found that the tension condition was superior to the normal in the partially controlled association tests, but made no consistent difference in the free association tests.

The results of both these studies tend to confirm the theory that tension aids in the maintenance of a definite mental set.

W. V. Bingham. *Industrial Psychology in America: An Appraisal.*

As background for appraisal of the status of industrial psychology in the United States of America, developments since 1909 are briefly sketched.

Typical recent investigations are cited as illustrative of contemporary methods, problems and results. These include:

Problems of highway safety. A study of individual differences in proneness to accidents among motormen in one city has led to developments of useful methods of diagnosing difficulties and effecting improvements in operation and supervision, by means of which a notable reduction in collisions and other accidents has been brought about. This approach is spreading to other street railways and to machine industries, supplementing the more familiar types of safety effort.

Selection and placement of federal employees. The federal postal service has been much improved through simplification of the work of mail sorters after psychological analysis of their job, and through development of the new type of practical examination by the United States Civil Service Commission. By means of this examination, 60,000 applicants for employment as distributors, carriers, and railway mail clerks are annually tested more easily, accurately, and fairly than before, with much less expense to the government, and with marked improvement in the average ability of the men appointed.

Factors affecting individual variations in output. By control of conditions in one department of a great factory over many months, it has been possible to correlate variations in measured output with changes in wage incentive, distribution of rests, and other variables, including workers' preoccupations as revealed in interview. The results are influencing managerial practice throughout the organization.

Industrial psychology in America is slowly overcoming a proclivity to generalize about the actual or prospective worker without adequate analysis of the work to be done, tools used, working conditions, incentives and rewards, relations with fellow workers and supervisors, and other factors affecting satisfaction, productivity, and well being.

Where problems, recognized by management as of serious moment, have been approached with adequate understanding of their industrial setting, the content, point of view, and methods of psychology have demonstrated their applicability and value. For such investigations industry is willing to provide opportunity and financial support.

HENRY BINNS. *Personal Judgment in Industry and Commerce.*

Industry advances as a result of continuous attempts to make the best use of natural resources and human inventions. These attempts involve investigations which may be classified as follows:

Production. Investigations necessary in designing the product; as to the nature and properties of the various materials used; and the construction and equipment of the necessary plant.

Direction and management. Investigations concerned with estimates of the quantity and quality of the product likely to be demanded; supply and cost of the labor and materials required; selection of the most suitable labor and materials on the market; financing of the industry; and other matters incident to buying, selling, and industrial management.

Physical science, working in the material field, discovers the quantitative relations between the cause and effect, and aids industry by originating methods and furnishing data from which the processes and the quantities of materials and energy requisite to produce a particular effect may be determined. It is of most service in matters classified under 'production' and when the time allowable for determining action is not strictly limited.

But in most industries, questions such as are indicated under 'direction and management' constantly arise. Here the factors are numerous and involved, and some of them, notwithstanding the aid that physical science can give, cannot be evaluated with the same accuracy. Such questions concern the qualities of agricultural produce, animal stock, wool, cotton, timber, tea, *etc.*, and of many manufactured and partially manufactured products, and also affairs of commerce. The quick solution of such questions is necessary, however, in order that prompt action may be taken.

Such judgments are mental operations, and are, therefore, within the field of psychological science. What faculties should an industrial leader possess and cultivate in order to minimize errors in his commercial judgments?

I suggest the following as

FUNDAMENTAL FACTORS IN JUDGMENT.

1. Capacity: natural and acquired for dealing with a new situation involving persons and materials.
2. Specific Ability: to concentrate on and coördinate numerous, complex, irregular and fluctuating factors quickly in one decision.
3. Knowledge: awareness of the existence to all factors of a problem with adequate knowledge of the essential ones.
4. Confidence: in oneself and willingness to supplement one's own information with that from trustworthy sources.
5. Intuition: arising out of subconscious memory in which is stored a much wider experience than that covered by the actual facts under review.
6. Impartiality: ability to weigh evidence, to control by will temperamental tendencies, to resist suggestions and to correct the bias caused by specialization.
7. Stability: Good health, with freedom from anxiety and other depressing emotions which tend to induce temporary but erratic fluctuations.

These principles are suggested as a working basis by which the accuracy of a particular judgment by a certain person may be assessed. While all the factors must of necessity overlap, it seems possible, in practice, to recognize each in important commercial decisions.

Charles Bird. *Maturation and Practice in the Coördination of Pecking Reactions in Chicks.*

This study is a continuation of previous work undertaken to discover to what degree increase in accuracy of a motor response, the feeding behavior of chicks, is a product of post-natal learning or of maturation and learning. The attempt was made to determine what percentage of final accuracy, measured in number of grains seized and swallowed during a specified series of trials, was reached by four groups of chicks during the first testing periods, with average age of the groups varying from less than one day to three days. Chicks to be kept from practice were placed in a darkened incubator and in boxes having a base of wire mesh so that practice of an unlearned complicated motor response was practically, if not entirely, eliminated. During the periods of delay forced-feeding was not attempted, since it might be argued that such feeding might either provide practice in manipulating grains or, on the other hand, might establish interference habits. Groups of chicks delayed beyond thirty hours, however, were supplied with water by means of a curved pipette guided into the crop before releasing its contents.

Immediately after the first tests each group of chicks was returned to the incubator for approximately twenty-two hours, when a re-test occurred. Following re-test the members of each group were permitted to feed naturally for eight hours, then were placed in restraining cages until again tested the next day. This procedure was followed daily until the twentieth day after hatching for each of the four groups.

The results show increases in accuracy from an average of 0.65 grains swallowed in twenty-five trials, at an average age of nine hours, to 4.6 grains at the age of three days. Since each group was permitted unlimited practice at the close of each period of delay, curves can be drawn to represent graphically the differences in accuracy between the four groups. These curves clearly indicate effects of age or maturation, on the one hand, and of practice, on the other. While all groups show a rapid initial acceleration in accuracy, the later progress is such as to confirm the results obtained by Moseley rather than those reported by Shepard and Breed.

H. G. Bishop. *Localization of Visual Film.*

In view of the fact that one must learn to know the positions of visual objects with respect to oneself, and in view of the further fact that these objects must take on perceptive objectivity through the proper coöperation of physical and psychological components, it is important that one discover the rules by which visual film is governed (a) while it remains film, but becomes localized and is, therefore, partially objective, and (b) in the genetically subsequent case in which an object is formed, totally devoid of filminess, and carries within itself only the hue of the film which it possessed before its transformation. This report deals only with the case in which film persists but becomes sufficiently molded and shaped to be localized, and is objective, therefore, to a certain degree.

In our experiments we set up a front screen near the observer which served to obstruct his view of all the apparatus, except what it was intended that he should see through the hole, 1 cm. in diameter, in the center of the screen. At varying distances from the observer we set up a rear screen which filmed at all its positions. Between the front and rear screens we placed wire netting of different size of mesh to serve as object and also as fixation point for the eyes. These nettings were also placed at varied distances from the front screen and from one another. Judgments of distances of netting and rear screens, filmed, and descriptions of the perceptions of distance were taken.

The result was that film tended to attach itself to the nettings, *i.e.* was localized in the netting, where fixation was judged to be. The localization was so closely linked with the netting that a copy of the netting drawn on the rear screen, as a final test of the intimacy of film and net, for perception, was not detected by the observers as being different from the screen and netting when they were actually separated.

STEFAN BLACHOWSKI. *Arithmothymic Inclinations in Youth.*

I apply the term "arithmothymic inclination" to every inclination to count which shows itself in any form whatsoever beginning with interest in the quantity of objects and reaching up to the arithmomanic impulse to count. As in other domains, here also scientists at first occupied themselves only with extreme cases, and it escaped their observation that arithmomania is merely a pathological variation of arithmothymia. As far as I know, such facts were pointed out and studied first by Magnan in his book *Leçons cliniques sur les maladies mentales,* in 1887, where he described a case of arithmomania combined with onomatomania. Ten years later Ginestoux[1] communicated the case of a twenty-seven-year-old person who, since her tenth year of age, had counted all the letters contained in the phrases which she heard, thought, pronounced, or wrote. Kraepelin[2] remarks that the imperative impulse to think of numbers shows itself frequently in neurotics. The patients feel a peremptory impulse to occupy themselves with the number of a vehicle or of a hotel room, to speculate if and by what numbers it is divisible; they are constrained to count the persons at table, knives, plates, glasses, or wall patterns.

The phenomenon of counting diverse objects is now observed in a far greater number of persons than was formerly admitted possible. There exists a very large group of arithmothymic persons in whom one can detect the phenomenon of counting in various degrees of intensity, and among them one recognizes the few arithmomaniacs in whom counting acquires an exaggerated form.

In 1925 I made a series of experiments with the students of the university in Poznán which yielded unexpected results. In a group of 96 students I found that 53, *i.e.* 54 per cent, had the inclination to count to a greater or less degree. The above mentioned group of students was composed of 48 men and 48 women.

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[1] *Rev. sci.,* 1, 1897, 473.

[2] *Psychiatrie,* 1915, IV, 1837.

In the women arithmothymic inclinations were more frequent than in the men (in 67 per cent of them as compared with 44 per cent of the men).

In 1927 I experimented with 71 new persons and found that 54 per cent were arithmothymics, the women again showing a larger proportion of them. In short, of the number of 167 persons with whom I experimented 91 (*i.e.* about 54 per cent) were arithmothymics. My statistics for women show about 61 per cent, for men about 47 per cent, having arithmothymic inclinations.

What sorts of objects were counted by the persons observed? The list of these objects is long: stairs (perhaps the most frequent object of arithmothymic inclinations), boards in the floor, lanterns, wall-paper patterns, columns, windows, pictures, buttons, steps during a walk, trees, autos, tram-cars, books on shelves, equipages at funerals, railway cars, stakes in fences, benches in parks, houses from one end of the street to the other, letters, money, *etc.* The statement made by one of the subjects applies to most of the cases: "If I see something arranged in a row, for instance, pictures on the wall, I count them."

Pierre Janet, who gives to arithmomania also the name of *manie de chiffres* or *manie arithmétique,* considers it a variation of the *manie de la précision,* because the patients, feeling an inner necessity for precision, occupy themselves with ideas which seem to them particularly precise, namely, "mathematical ideas or rather the most simple of them, the numbers."

To the sphere of arithmomania belongs, according to Janet, the predilection to remember different dates, the age of acquaintances, their birthdays, and every contemporary event. Persons, who are able to recite by heart the dates of birth and death of all the inhabitants in their village or the railway time-table, are not gifted with extraordinary memory as one might believe but are individuals with pedantic inclinations who concentrate their whole attention upon those things and do not care to learn anything else.

The importance of our study consists above all in the discovery that arithmothymic phenomena are not to be considered as something extraordinary or exceptional. Moreover, as they appear in a great number of persons with very different degrees of distinctness and force, they deserve to be studied more deeply than has heretofore been possible on the basis of the purely pathological material on hand.

PHYLLIS BLANCHARD. *The Clinical* vs. *the Legal Approach to Problems of Sexual Psychopathology.*

The clinical approach to problems of sexual psychopathology emphasizes the search for causes of behavior, for methods of prevention and corrective measures. The legal code is predicated on the concepts of punishment, of redress for the injured individual, and of protection for the group. Legislation tends to represent popular prejudices and to lag behind scientific study. Examples: laws regarding birth control; inclusion of sex offenses in state laws for life sentence after fourth offense; court decisions regarding sex education pamphlets, *etc.*

In cases of sex pathology, court procedure is more likely to cause further injury than to provide for redress, especially when children or adolescents are involved. When the actual sex experience is handled according to clinical methods, it need cause no permanent maladjustment. The experience in court is frequently of a kind that induces a psychic trauma and causes lasting maladjustments. Illustrative cases: twelve-year-old girl brought to clinic after having appeared in court against a man who assaulted her; thirteen-year-old boy forced to suffer homosexual acts over a four-year period, showing contrast between clinic treatment and court experience.

Particularly undesirable aspects of court procedure in such cases are the trial by jury, the placing of children on the witness stand to recount their experiences in a crowded courtroom, and the lack of clinical facilities in connection with the court for handling such cases.

Phyllis Blanchard. *A Contribution to the Clinical Study of Stealing.*

Data: The paper concerns 80 children, studied and treated by the Philadelphia Child Guidance Clinic, in whom stealing was a major problem. The group is a representative sample, since it includes all the children referred for stealing during a period of one year. Offenses vary from minor ones to those sufficiently serious to bring 14 of the children to court. Besides stealing, lying was a problem in 72.5 per cent and truancy in 43.7 per cent.

Intellectual status: Subnormal (60–80 IQ), 7.5 per cent; dull normal, 23.7 per cent; average, 47.5 per cent; superior, 20 per cent. Highest IQ, 150.

Social status: Broken homes, foster homes, or institutional care, 57.5 per cent; poverty, 57.5 per cent; discipline overstrict, inconsistent, or lax, 75 per cent; delinquent parent, brother or sister, or other relative, 27.5 per cent; gang member, 23.7 per cent; lack of recreation, 23.7 per cent.

Drives to misconduct: Stealing (and other misconduct) seems to persist, due to drives to gain satisfactions. Compensatory mechanisms, 35 per cent; acceptance by gang, 22.5 per cent; substitute for or associated with sex activities, 20 per cent; recreational outlets, 12.5 per cent; acceptance by delinquent brother or sister, 6.25 per cent; escape from home (money to run away), 3.7 per cent. These drives frequently arise from deprivations in the child's life. He turns to the gang for acceptance which he does not find at home; he needs to compensate for failure to make good at home, at school, or with playmates; he steals to get recreation that his parents are too strict or too poor to provide.

Results of treatment: Cases studied between April 30, 1927, and April 30, 1928; many have been treated for a year or more. Treatment is continuing in 45 cases; 35 have been closed. Adjustment of closed cases: 17 partially satisfactory (home and school situations and behavior markedly improved); 8 cases entirely satisfactory; 8 unadjusted (treatment having been blocked); 2 families moved away and present status unknown.

WILLIAM E. BLATZ. *Emotional Episodes in Nursery School Children.*

Observations of emotional episodes were made upon eighteen children attending St. George's Nursery School over a period of five months; 240 such incidents were recorded. It was found that most emotional episodes occurred in the playground between 10 and 11 A.M., during the 'free-play' period. Children between two and three years old manifested nearly twice as many incidents of emotional behavior as those between three and five years of age. There was a definite difference in the apparent causes of this behavior in the two groups. In the younger group the most frequent apparent causes were "leaving parents," "resistance to school routine," and "unknown"; in the older children "accidentally hurt," "hurt by other children," and "interference by other children in play activity." The most frequent types of behavior aroused by such situations were "crying" (92 per cent) and "screaming" (13 per cent). The younger children responded among other means by "hitting" (7 per cent), "pushing" (7 per cent), "whining" (7 per cent), and "sulking" (2 per cent); the older children, "hitting" (14 per cent), "whining" (3 per cent), and "sulking" (11 per cent). This is a preliminary study which will be expanded by further and more controlled observations next year.

WILLIAM E. BLATZ. *What Is Maladjustment?*

HUGH C. BLODGETT. *An Analysis of the Behavior Units in Maze Learning.*

This paper reports a study of the elements or units involved in the maze-learning of white rats. The problem is (1) to determine whether the learned maze-response is a synthesized response or a configuration in which a particular phase is a function of all that has preceded; or a series of fairly specific units each of which acts independently, or relatively independently, of the preceding units, and (2) to delimit the specific units if any are found.

A maze was constructed having two interchangeable starting sections, S′ and S″; a common central section, K; and two interchangeable end sections, E′ and E″. The two beginning sections and also the two end sections differed one from another in pattern, but each contained four blind alleys and a true path with a length of 80 inches. The constant section contained eight blind alleys and a true path with a length of 160 inches. By means of sliding doors the maze could be presented as either of two mazes, S′—K—E′; S″—K—E″, having in common a central section K.

The experimental procedure was as follows: An experimental group was run once a day on days 1, 3, 5, *etc.*, over pathway S′—K—E′; and on days 2, 4, 6, *etc.*, over pathway S″—K—E″. A control group 1 was run on alternate days, but always on pathway S′—K—E′. A control group 2 was run on alternate days, and always on pathway S″—K—E″. Each of these groups consisted of thirty-six animals.

If each section of the maze were learned in more or less specific units, one would expect that section K would be learned more readily by the experimental group than by the controls 1 and 2, since practice for the experimental group was twice as frequent. If, on the other hand, each pattern presented itself as a configuration, one would expect the identity of section K to change as between S′—K—E′ and S″—K—E″. In the latter case two distinct habits would be set up in the experimental group. One could test this assumption by comparing the records on K for experimental group on days 1, 3, 5, *etc.*, with those of control 1; and again by comparing experimental group on days 2, 4, 6, *etc.*, with control 2. A comparison of the scores for section K shows this latter hypothesis to be incorrect. The improvement of the experimental group was markedly superior to that of the control groups.

Having on one run practiced the path S′—K—E′, the animals of the experimental group were next required to traverse path S″—K—E″. This involved a left turn at the end of section K where a right turn had been made on the previous run. In no case was an animal able to make this response correctly, a fact which indicates that differential cues were not carried from S′ or S″ across a section as long and complex as section K.

The next step was to reduce the length of the constant section to a length of 8 inches with one right-angle turn; then to increase it to 16 inches with two right-angle turns, and so on. Here it was found that (with new groups of animals) the influence from S′ or S″ carried over a comparatively short section, the range being from 8 inches to 32 inches in 80 animals.

The findings indicate that in the learned maze response of these animals the behavior units have a limited range, and a small degree of interrelation.

W. N. Boldyreff. *Two Kinds of Psychic Reflexes, Their Nature, Similarity, and Difference.*

In experiments on dogs with salivary fistulas the author established that frequent, repeated application of very pleasant (tasty food) or very unpleasant substances (strong irritants of the oral cavity such as acids, mustard, salts) cause a marked change in the activity of the salivary glands. In the case of pleasant (useful) substances the activity of the glands invariably and abruptly diminishes through the frequent repetition, while in the case of unpleasant (harmful) substances it is abruptly increased.

The decrease or increase of the glandular work is expressed not only in quantity of secreted saliva, but is also reflected in its composition. In the first case the saliva becomes more watery; in the second, more viscous. If the pleasant substances, due to some cause or other, become unpleasant, their frequently repeated application would in that case have not the effect as in case I, but as in case II.

The same changes were observed in the activity of other glands of the digestive system (gastric) and of the glands of other categories (sex and lachrymal), the activity of which is governed by the cerebrum.

All foregoing statements are also true of other animals than dogs, as was found by observation on birds and men (Kalischer, Krasnogorsky and others).

The described physiological phenomena belong to the sphere of reflexes; in the psychic activity they correspond to some definite conditions which could be called psychic reflexes (the cerebral reflexes of Setchenoff or conditioned reflexes of Pavlov).

Therefore, in frequently repeated irritation, physiological decrease in work (case I) is shown by the corresponding decrease of pleasant sensations; increase (case II), on the contrary, is shown by the increase of unpleasant sensations.

The literary data (Setchenoff) show that this is true also for the psychical reflexes of the muscular system, controlled by the cerebrum.

Evidently, in the case of repeated frequent irritations, we deal with two diametrically opposite laws, which are reflected in the cerebral activity and through it on all bodily functions.

The removal of the cortex of the brain (experiments of the Pavlov school) or temporary interruption of its work by poisoning (alcohol intoxication, *etc.*) stops the action of these two laws.

Long interval in the reception of the sensation does away with the influence of both laws. The change of irritants in case I (pleasant ones for more pleasant) has the same effect as an interval and has no influence in case II.

The phenomena which we have observed and formulated in two laws point out that, in the main, no pleasant or unpleasant irritation (with their sufficient strength) passes without leaving a trace. They all forever leave somewhere in the brain a hidden trace. Pleasant irritants create inhibition; unpleasant irritants, on the contrary, create but hidden excitement.

V. M. BOROVSKI. *Experiments on Variable Habits.*

The purpose of this experiment was to map out the lability of habits in the white rat. The ability of the animals to be guided by unequal cues while learning equal component parts of a complex habit was investigated by means of a specially devised four-unit-double-choice apparatus. The experiments so far showed the following.

1. Rats have no particular difficulty with this kind of habit.

2. Rats are more guided by negative than by positive cues, *i.e.,* they learn more readily *not* to do than to do something.

3. Cues are most effective when size, form, and elevation of the opening above the floor are combined together; they are least effective when they differ only in form, but are of the same size and elevation.

4. Rats combine the form with the size of the opening which they climb through, but not the form of the opening with the coloration of its background.

5. When new cues are introduced successively, the rats master the habit more readily than when they are all introduced at the beginning.

6. The addition of the second cue to the first delays the habit more than the addition of the third to the first two, and still more than the addition of the fourth to the first three.

General Conclusions.

(a) Not all the elements of a situation are unified in one totality by the rats, for they may combine form with size and elevation of the opening, but not with the coloration of the background, although they are able to orientate themselves by coloration alone.

(b) The learning process consists both of a gradual grasp of the total situation and of a gradual mastery of its elements. The formation of the habit as a whole aids the fixation of its parts as much as the fixation of the parts hastens the formation of the habit as a whole.

(c) It is proposed that learning proceeds neither from part to whole nor from whole to part, but that part and whole are two components of one process. The result of learning is thus a function both of whole and of part learning.

L. Bouman. *Involution Psychoses.*

Our knowledge of involution-psychoses takes both psychological and biological factors into consideration.

An important *psychological* factor is that of growing older, a change which involves changes in social position: the subject feels 'rooted up'; the power of adaptation to the demands of life has diminished; the character-traits are exaggerated; and affectivity has stiffened. Moreover, the body-scheme has undergone a change (for the sensations in a person's body change as he grows old). The altered body-scheme and the memory of the body-scheme as it was in youth form the background of all actual experiences in *presenium* and *senium.* One feels a relaxation in the muscular tonus, and all kinds of abnormal sensations. Very often the auditory and visual functions have diminished, with a resultant feeling of dependence.

An important *biological* factor is *heredity.* In involution-melancholia we find direct and familial heredity almost without exception; whereas paranoic symptoms are frequently found in the families of paranoic and paranoid patients. The psychical changes during climacterium resemble in many respects those that are found in the so-called involution-melancholia. We find also in this period cases of *paranoia levior* in which the psychical factor of the approaching climacterium plays an important part in addition to an involution-paranoia. This involution-paranoia is, however, not quite identical with Kleist's involution-paranoia, which is an incurable delusion-forming psychosis, for it is a psychosis in which biological and psychological factors play an important part, in which also the personality remains intact, in which there are no hallucinations, while the delusions are not permanent, for their place is sooner or later taken up by new delusionary ideas, and the former delusions are then seen critically by the patient. With involution-psychoses in a stricter sense of the word, are usually reckoned: (a) involution-melancholia; (b) Kleist's delusion-forming involution-psychosis. We must consider a slight biological stimulus able to provoke the endogene predisposition. More marked biological changes such as progredient arteriosclerosis or involution of the central nervous system or disorders of internal secretions would then be apt to provoke more serious or even incurable psychoses.

It is important to note the peculiarities of the phasic and curable forms of involution-melancholia. It appears that the prognosis is the better the more there is likeness to the more juvenile forms of melancholia. This may be either a likeness in a psychopathological or in a somatic sense. Among the cases with a bad prognosis we find a fair number of patients with disorders of internal secretion and with diseases of the heart and blood-vessels.

These changes are intercalated in the normal psychological and biological factors of growing older and so a special disease-picture is formed. In the group composed of paranoia and paranoid states, the difficulties are much greater. The paranoia type of reaction cannot well be grasped psychologically. Sometimes, however, we can indicate the presence of a constitutional paranoic disposition, in which case we see the reappearance of a second paranoic phase in the period of involution, a first paranoic phase having preceded it in younger years. In still other cases we see a paranoid state developing itself during the period of involution which a paranoic phase has preceded in younger years. And at last paranoid states may occur for the first time during involution. Here we must suppose internal secretionary and involutionary factors to be at work. Analogies can be found in syphilitic and tabetic psychoses and also in epidemic encephalitis. We may expect these same factors to be at work in those cases of melancholia in *senium* and *presenium* in which we find mistrust and delusions.

L. BOUMAN and A. A. GRÜNBAUM. *Störungen der Chronognosie.*

Das konkrete Zeiterlebnis baut sich hauptsächlich aus folgenden drei Schichtungen auf: (1) der Chronognosie, die die unmittelbare Rückerinnerung, in welcher die Vergangenheit perspektivisch geordnet ist, und die mit der Gegenwart verbundene unmittelbare Prospektive der persönlichen Zukunft umfasst; (2) der Chronologie, in welcher die interindividuell gegebenen aber ursprünglich persönlich wichtigen Daten als Wendepunkte der Lebensgeschichte verwertet werden und so zur Bildung der Phasen und Perioden der "gemeinsamen" Zeit beitragen; (3) der Chronometrie, der objektiv gemessenen Zeit, welche zur

näheren persönlich unabhängigen Bestimmung der Chronologie verwertet wird und zu der Kalenderzeit führt. Jede auf dem Wege der mittelbaren Erinnerung oder eines Schlussverfahrens entstehende Zeitbestimmung der Dauer und des zeitlichen Abstandes eines Ereignisses von der momentanen Gegenwart beruht letzten Endes auf Daten des unmittelbaren Zeiterlebnisses. Bei Abweichungen der Chronognosie von den durch die Erfahrung verifizierbaren Daten der Chronologie und der Chronometrie messen wir der Chronognosie bloss subjektive Bedeutung zu und sind geneigt, ihre Angaben in Uebereinstimmung mit der gemeinsamen Chronologie zu bringen.

Im folgenden wird über eine eigenartige Störung der Chronognosie berichtet, in welcher der subjektiven Abweichung des konkreten Zeiterlebnisses durch den Patienten eine objektivere Bedeutung zugeschrieben wird als der in seinem Wissen noch gegebenen gemeinsamen Chronologie. Um beide in Uebereinstimmung zu bringen erklärt der Patient nicht sein subjektives Zeiterlebnis als eine Täuschung, sondern verneint die *auch ihm gegebene* objektive Chronologie.

Es handelt sich um einen Fall des postinfektiven psychischen Schwächezustandes, welcher etwa 30 Jahre dauert. Der Patient ist jetzt 60 Jahre alt, hat aber von seinen letzten 30 Jahren mindestens 20 Jahre im Bett, meistens im Zustande der äusseren Untätigkeit und psychischen Benebelung, durchgebracht. Bei sehr gutem Gedächtnis, genügender Intelligenz und vollkommener persönlicher und sozialer Orientierung behauptet der Patient höchstens 34 Jahre alt zu sein. Nicht nur ist die Lebensdauerzeit nach seiner Krankheit in seiner reconstruierenden Erinnerung auf 4 Jahre zusammengeschrumpft, sondern auch verschiedene grosse, deutlich in der unmittelbaren Erinnerung gegebene Periode seines Lebens dementsprechend verkürzt sind. Auch die unmittelbare rezente Vergangenheit von 1 Stunde schrumpft in der rückschauenden Erinnerung auf 15 Minuten, eine Viertelstunde eher auf 5 Minuten. Tag und Nacht dauern zusammen nicht 24, sondern 18 Stunden, zwischen Frühling und Frühling gehen höchstens 3 Monate vorbei.

Da die Nichtübereinstimmung dieser Zeiterlebnisse mit der objektiven Chronologie ihm deutlich zum Bewusstsein kommt, erklärt er sie durch die Annahme, dass die Dauer der chronometrischen und chronologischen Daten wie Stunden, Tag und Nacht, Monate und Jahre objektiv kürzer geworden ist. Auch seine Einstellung auf die Zukunft entbehrt jeder Perspektive. Unser Patient hat nicht bloss keine Zukunft, sondern diese Kategorie hat für ihn gar keinen Sinn.

Der energetische Akzent, der die konkrete Gegenwart von der Erinnerungen, Vergangenheit und von der Zukunftfantasie unterscheidet, fehlt in den Erlebnissen unsres Patienten. Alles liegt für ihn auf einer energetischen Ebene der Gegenwart und der rezenten Vergangenheit, wodurch auch verschiedene Wunschfantasien und Tagesträume nachträglich einen Realitätscharakter erhalten und nicht korrigiert werden.

Durch die Störung im Erlebnis der zeitlichen Kontinuität entstanden in den frühesten Perioden seiner Krankheit auch Erlebnisse, die an manche schizophrene Bildungen denken lassen, z. B. die Wahrnehmung als ob bei seinem völligen Bewusstsein die gesehene Landschaft plötzlich völlig verschwindet und wieder auftaucht. Es bildet sich bei ihm eine neue Bewusstseinsstruktur, bei welcher eine Irrelevanz gegen die gemeinschaftliche Zeitrealität und alle ihre objektive Konsequenzen entsteht. Die Störung, die oberflächlich behandelt als Wahnbildung oder Intelligenzdefekt imponieren konnte, geht auf diese neue Bewusstseinsstruktur zurück und hat zur Grundlage die allgemeinste kategoriale Störung des Bewusstseins.

M. Adelia Boynton. *The Postural Habits of Nursery-School Children during Sleep.*

In an attempt to supplement the mechanical records of frequency of movements during sleep which have been made by other investigators, visual observations and records of the character of the movements of 56 nursery-school children during the nap-period have been made during a period of several months.

(1) Results show that a general preference for the side posture

as opposed to either back or stomach is evidenced by (a) the total amount of sleep taken in each posture, (b) the initial posture on falling asleep, (c) shifts from one posture to another, and (d) the mean length of rest period in a given posture. According to the same criteria, the right side has a small advantage over the left, the stomach over the back.

(2) Sidis' assertion that individuals tend to fall asleep on the side corresponding to the preferred hand is not substantiated by our data. The correlation between extent of right-handedness as measured by a comprehensive scale and the percentage of times the subject went to sleep on the right side was practically zero, but the correlation between the tendency to go to sleep on the left side and the extent of right-handedness was +0.338. The correlation between right-handedness and percentage of total sleep on the right side was slightly negative (—0.11), but that between right-handedness and percentage of total sleep on the left side was +0.530. This suggests that the slight general preference for the right side is related to factors other than handedness, and that on the whole, individuals tend to assume a posture which frees rather than inhibits the movements of the preferred hand.

(3) A small but reliable relationship exists between the extent of postural habit formation and the length of time required to go to sleep.

(4) The relationship between the length of the nap period and room-temperature is curvilinear, either extreme being unfavorable for the continuation of sleep. Under our sleeping conditions, the optimal room-temperature was from 50° to 60° F.

J. W. Bridges. *What is Abnormal Psychology?*

According to the statistical definition *abnormal* means deviating from the central tendency of a population. There is thus no dividing line between the normal and the abnormal. Various degrees of abnormality exist, but *abnormal* may be understood to designate the more marked deviations. This definition of the abnormal has been adopted by a number of recent writers on the subject; but they do not all hold consistently to this point of view. For instance, some of them urge the desirability of developing normal children. It is obviously not particularly desirable to be mediocre.

If the statistical definition is adopted, it follows that abnormal must be distinguished from socially undesirable. These concepts belong to two different universes of discourse—one scientific, the other ethical. The abnormal must also be distinguished from the pathological. It includes the latter, but it likewise includes any extreme deviations from the norm whether they happen to be morbid or merely constitutional in nature. The abnormal, moreover, includes both the supernormal and the subnormal. These are the obviously quantitative deviations. It likewise includes certain apparently qualitative deviations, such as paramnesia and hallucination. Such deviations may be called "paranormal." They are probably also quantitative at basis.

Abnormal psychology is thus the study of all extreme deviations from the norm or central tendency. It is related to the psychology of individual differences since it treats of the more marked differences. It includes but it is broader than psychopathology, which is the psychology of morbid abnormalities. It is obviously not education, ethics, or social philosophy, yet it is not always clearly distinguished from them. Abnormal psychology has nothing to do with the good and the desirable, nor with the aims of education.

Abnormal psychology is primarily a pure science but may be applied in various fields of human activity, particularly in medicine. It must, however, be distinguished from medical psychology. The latter is the application of psychology, normal and abnormal, to the medical problems of prophylaxis, diagnosis, and therapy. Abnormal psychology must likewise be distinguished from mental hygiene which is concerned with the application of psychology to the problems of prophylaxis. It should moreover be distinguished from so-called clinical psychology, which is an application of psychology chiefly to the problems of diagnosis. Finally, it must not be identified with psychoanalysis. which is in part a psychological theory and in part a diagnostic and therapeutic method.

K. M. Banham Bridges. *A Genetic Theory of the Emotions.*

The following theory concerning the emotions is a slight modification and extension of recent theories. It was developed in order to account for the facts observed during a three-year study of the emotional behavior of nursery school children. It seems probable that there is an original undifferentiated emotion of excitement, made up of somewhat uncoördinated visceral and skeletal responses. In a highly stimulating situation a young infant gives all kinds of visceral, glandular and motor responses. Some of these visceral reactions become differentiated from the rest, conditioned to certain stimuli and combined with particular skeletal responses as a result of experience to form the various well-known emotions. The first two to be differentiated early in infancy are distress and delight. The former is a reaction to disturbing stimuli such as shock and interference, while the latter is a response to satisfying stimuli such as food and rhythmic movements.

Distress becomes further differentiated during infancy and combined with instinctive avoidance and aggression to form the emotions of fear and anger. Delight becomes differentiated into joy and affection. The former is shown in relation to specific events and objects, and the latter with regard to persons. By the nursery-school age, fear, anger, joy and affection may be distinguished. In addition to these specific emotions the earlier established and less differentiated emotions also continue. A particular emotion is distinguished more by the general behavior and situation which arouses it than by the accompanying visceral reactions. The latter are found to vary from individual to individual, and in different instances of the same emotion.

Other emotions become differentiated during childhood and adolescence, such as shame, jealousy, elation, parental and sexual affection. The form of the emotional behavior changes along with general development. Even the undifferentiated emotions of excitement, distress and delight when they occur in later childhood and adult life are modified and comprise more organized behavior responses. The emotions therefore undergo a process of development. They are acquired and show individual variations. No two individuals acquire the same set of emotions because of constitutional and environmental differences, but there are some emotions, based on common experiences, which are much the same for all.

A. A. Brill. *Psychoanalysis and Conduct Problems.*

To illustrate how conduct problems are attacked psychoanalytically a case is cited of a boy of ten years brought in for treatment because he suddenly developed the bad habit of chewing the lapel of his coat, his sleeve, or whatever he could get into his mouth.

Various remedies, physical and psychical, had been tried by physicians without success; however, all these remedies consisted of suggestions in the form of prohibitions and commands without any regard to the origin and meaning of the symptom.

One can say that the patient for some reason regressed to an oral activity (thumb sucking) of the autoerotic phase. Investigation showed that the chewing symptom appeared within two months after his father's death, when the neurotic mother centered all her love on this boy. She unconsciously took her son as a substitute for her dead husband, and this in turn revived in him a strong oral fixation (early struggle with thumb sucking). Besides the analytic work the boy was permitted to chew gum and licorice, hitherto strictly forbidden by his mother.

The symptom was cured, first by tracing it back to its early fixations, by stopping the source of libido increase (instructing the mother, and explaining the situation to the son), and by giving the patient a substitute outlet (sublimation) through chewing of gum.

Augusta Bronner. *A Psychological Examination of Legal Testimony*

There is a considerable body of literature accumulated, both in this country and abroad, on the psychological problems involved in legal testimony beginning with the well known work of Stern in 1902. A summarization in English of the experimental work from that date until 1913 appeared in Wigmore's *Judicial Proof,* and again in 1917 in Bose's *Introduction to Juristic Psychology.*

Scientific investigation has been of two types, the well known *Aussage* experiments, and experiments dealing with the report of actual events. In spite of a considerable amount of experimentation, there has been no welding of the findings into any sound foundation for practical procedure; and little or no impress has as yet been made on the legal profession, *i.e.* on judges and juries.

In guidance clinics dealing with actual court cases, there is valuable opportunity for the study of the psychology of testimony, both because information concerning actual performance in the court room is available for correlation with results of experimentation, and because children and young people are studied in such clinics for mental status, personality characteristics, experiential facts, *etc.* The *Aussage* tests can thus be given in a natural setting, and the results compared with those obtained on other pertinent tests. It is possible also to note sex-differences, age-differences, correlations with general intelligence and with special abilities and disabilities, and a number of related topics. For years we have ourselves carried on such experiments with the *Aussage* tests on a large number of juveniles between the ages of seven and eighteen years, and the event-test on a smaller number. We have also gathered anecdotal material on certain cases of special interest, such as the pathological liar, the defective verbalist, the border-line psychotic.

For purposes of comparison similar experiments were undertaken with a small group of highly successful adults and with another group of law students who had recently completed a course on evidence. Some of the more striking results of the study are as follows: (1) the sex-differences are negligible; (2) the group under fourteen years of age give as accurate testimony as those over fourteen; (3) the defectives are meager but more accurate testifiers than the normal, giving fewer fictional items, but they are more open to suggestion; (4) the law group, in spite of their training, show many of the characteristics of the untrained; (5) fictional items (elaborations) are recalled after brief and long periods more fully than items of fact.

A. Bronner, see also W. Healy.

Warner Brown. *Conscious Concomitants of Learning.*

Accounts of animal learning are frequently criticized because they seem to ascribe to the animal conscious processes like those of a human subject under the same conditions. It has never been shown, however, that human subjects themselves have the experiences in question.

With human subjects in a life-size maze several situations have been examined with respect to the conscious concomitants of learning.

1. The affective aspect: learning when a disagreeable experience is invariably encountered at the goal is contrasted with learning when a mildly pleasant experience is encountered at that point.
2. The awareness of visual cues: learning (a) with blindfold, (b) with sight of the room but not of the maze or ground, (c) with full vision but with the distinction between true-path and culs-de-sac remaining visually indeterminable.
3. The awareness of auditory cues.
4. The awareness of tactual or kinesthetic cues (a) in the true path, (b) in the culs-de-sac, (c) at a point just preceding the turn.
5. Lengthening or shortening the learned path.
6. Introducing new culs-de-sac, detours or short-cuts into a learned path.
7. Changing the orientation of the entire maze in the room but without disturbing the internal pattern of it.

Charlotte Bühler. *Spontaneous Reactions of Children in the First Two Years.*

The problem of spontaneity in behavior is one of the most difficult in theory and experiment. How much in the behavior of a living being is due to its own initiative, how much to the situation? From the very beginning of life we have with the child a definite selection of stimuli, to which the child in each stage will react. In a situation which continues to be the same around the child for months, the child will be stimulated to the most diverse reactions.

If you present, as the experiment does, to children of each age-group in the first and second year, the same simple optical stimuli, their reactions will change from staring and looking to grasping and from grasping again to a new kind of looking. This means that the selection of what will be effective in an object, its optical or its tactile qualities, is not determined by the object, but by the stage of development and its disposition towards the display of certain activities.

CHARLOTTE BÜHLER. *Personality Types Based on Experiments with Children.*

There is one feature of character which, in our experiments with children, we found displayed as early as in the second half of the first year. In the experiment two children play together. They are from one-half to two years old and are thus in different age-groups. Now as soon as the children get in touch with each other, each will display certain *attitudes* towards the situation and towards the other child. Among the attitudes which we could observe there seem to me to be three which I wish to differentiate and to consider as types.

Attitude 1. I call it *socially blind.* The child which is socially blind does not pay any attention to the other child. It is not influenced nor impressed by the other's movements. It pays all its attention to objects, is interested only in the toys and in getting them for play; would cry or wildly defend itself, if the other attacked it, but does not observe the other's disposition.

Attitude 2. I call it *socially dependent.* This attitude is the opposite of the first in so far as the individual with this attitude is always and eagerly interested in the other child and orientated in each of his own movements with regard to the other child. This orientation, which socially dependent people get from other people is to be characterized in a specific manner. Whether the individual is aggressive and active or whether he is reactive and passive, he always *rivals* the other. Such a child does not take any toy lying before him, but tries to get just that toy which the other child has. He will smile in triumph when he overcomes the other, or will be depressed when the other overcomes him. He displays himself before the other, and never permits the other out of his eye. If he is aggressive he becomes a despot; if he is passive he becomes hampered by the presence of another individual.

Attitude 3. I call it *socially independent.* While the characteristic of the first attitude is that the child seems to be only in contact with objects, not with other people, the characteristic of the second attitude is that the child is always and with obvious effort in contact with other people, even though his contact seemed to bring him quite out of balance, the orientation in the other child was so strong that the child seemed to get all initiative from the other's reactions. The third attitude differs from the two others in that the individual is in contact with the other, but never looses his own initiative or balance, and very quickly comes into harmony with himself. The child of this type is not embarrassed in a situation with another; it would play with the other, would comfort and help it, and displays an ease and a kind of superiority which differs from the success of the aggressive second type.

(1) As always in speaking of types, a concrete individual represents it only to a certain extent. The type as such is an abstraction to which concrete individuals approach.

(2) These types are *developmental attitudes.* The social blindness, the social dependency and the independency mark three steps of development, corresponding to the development of the other functions, for the being unorientated to the social object is the most primitive state, the being in but not master of the social situation is a second stage, and the being orientated and mastering the situation is a third stage of development.

(3) These steps do not, however, necessarily mark the develop-

ment of the individual. The three attitudes are types in so far as we seem to be born with the disposition more in one direction than in the others. There seems to be something like an inborn harmony or lack of it, and a social behavior corresponding with that from the very beginning.

KARL BÜHLER. *Erlebnis, Benehmen, und Werk.*

Es gibt drei Zugänge zu den Tatsachen der Psychologie, vom Erleben, vom Benehmen und vom Werk aus. In der Völkerpsychologie von Wundt sind es z. B. die Sprache der Tiere und des Menschen, die Produkte der Kunst, die staatlichen und rechtlichen Institutionen und andere Objektivationen des Kulturprozesses, von denen der Verfasser ausgeht, um psychologische Erkenntnisse zu gewinnen. Warum sollte es unmöglich sein, aus dem fertigen Werk Rückschlüsse zu ziehen auf den, der es geschaffen hat, und auf den Prozess, aus dem es hervorgegangen ist? Der analoge Forschungsweg vom Produkt auf den Prozess hat in der Geologie, Archäologie, Geschichte zu anerkannten Ergebnissen geführt; auch die Psychologie kann ihn nicht entbehren.

Das Gleiche gilt für jeden der beiden anderen Aspekte. Es ist die grosse und bewundernswerte Leistung des Behaviorismus, die Tier- und Kinderpsychologie zu einer exakten Wissenschaft gemacht zu haben. Wir können der Lage der Dinge nach beim Tiere und dem menschlichen Kinde der ersten Lebensjahre kaum anders als behavioristisch vorgehen, d. h. ihr Benehmen in natürlichen oder künstlichen Situationen systematisch beobachten, um Gesetze des Verhaltens zu finden. Die Frage ist nur, ob man auf diesem Wege und mit den Mitteln des Behaviorismus *allein* die ganze Psychologie vollenden kann. Ich verneine diese Frage und habe meine Gründe in dem Buche *Die Krise der Psychologie* systematisch entwickelt. Der Beweis wurde dort am Beispiel der Sprache durchgeführt.

Hier möchte ich Sie einladen, einen prüfenden Blick auf ein beliebiges Sinnesgebiet, sagen wir auf die Theorie der Farben zu werfen, um zu erfassen, ob es *zweckmässig* wäre, den Erlebnisaspekt aufzugeben. Gleichviel ob wir uns Helmholtz oder Hering anschliessen, so wissen wir, dass die Farben des vollsinnigen Menschen einen dreidimensionalen Bereich ausmachen und die der farbenblinden Menschen um eine oder zwei Dimensionen ärmer sind. Erst als dies mit den Mitteln der alten Erlebnispsychologie am Menschen gefunden war, hatte man eine exakte Basis, um auch die Farbreaktionen der Tiere mit behavioristischen Methoden zu untersuchen. Carl von Hess war der erste, der diese Methoden entwickelte; sowohl er wie seine Nachfolger und Gegner haben sich bei ihrer Fragestellung und bei der Auswahl der entscheidenden Bedingungen ganz auf das am Menschen gefundene Ergebnis gestützt und sind nur so auf kurzem Wege zu sehr beachtenswerten Ergebnissen gelangt. Das ist ein historisches Faktum. Hätte man anders vorgehen sollen?

Meine Auffassung ist: jeder der drei Grundaspekte ist *möglich* und keiner von ihnen ist schlechthin entbehrlich in der Psychologie. Wer einen äusserst verwickelten Gegenstand von drei Seiten her betrachten kann, wäre unklug und ginge unzweckmässig vor, wenn er auf den Vorteil, alle drei auszunützen, verzichten wollte.

TRIGANT BURROW. *Emergent* vs. *Deterrent Differentiations in the Evolution of Human Society.*

With the development of language man employed signs or symbols to stand for the objects of reality. These signs or symbols represented a characteristic feature or part of the object. The symbol is thus a replacement socially, or by common agreement, of the part for the whole. This short-cut designation has proved a very handy tool for man's use. In its simplest application the sign or symbol was of the utmost economic gain to man in mediating his relationship to the objects surrounding him.

This economic gain through the development of language or consciousness has had its serious liabilities as well as its assets. In removing himself from actual organic contact and muscular use of objects themselves man has to an extent developed his cerebral faculties at the expense of his organism as a whole.

Further, his long preoccupation with images standing for objects, too often tends to give to these images the value of reality. One may judge the extent to which this discrepancy in man's interpretations has crept in to distort his true, organic perceptions of actual objects, if one will consider the wide difference in meaning connected with such implements, let us say, as the spade, the mattock or the wheelbarrow according as they are a purely spoken or written symbol to the scholar in his study, or as they are physiologically employed in the daily use of the laborer who knows them by their weight, their resistance or by their actual *feel.*

This organic misconception of man's relation to the objective universe through the confusion of the symbol with the reality symbolized, is still further confused through man's application of the symbol in substitution for the feelings expressive of his subjective life.[1]

It is the claim of the present thesis, based upon the observation and study of groups of individuals from the point of view of their actual reactions to one another in contrast to their symbolic interpretation of one another *inter se,* that the confusion of feeling resultant upon the substitution of social images for the organic reality symbolized by them is a significant biological factor in causing the dissociated conditions manifested in insanity and allied reactions.

TRIGANT BURROW. *The Social Reaction of Right and Wrong: A Biological Approach to Criminal Behavior.*

Our normal and social standards of right and wrong do not represent scientific standards. On the contrary, instead of affording a stabilized basis of measurement and evaluation, they are entirely variable and arbitrary.

The sensations and reactions embodied in our feelings of right and wrong are expressive of the relationship of individuals toward one another. In the absence of inter-individual relationship there could be no sensations of right and wrong. The sensations which exist among us socially or inter-individually as right and wrong are the expression of physiological strains and tensions within the social organism, just as sensations occurring in response to pressure, pain or hunger are the expression of physiological reactions within the organism of the single individual. A controlled study and observation of group or community inter-reactions is the function alone of the laboratory of social or community biology.

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[1] The autonomy of the 'I' from the standpoint of group-analysis. *Psyche,* 8, 1928.

In the light, then, of an intrinsic social biology, healthy social reactions are dependent upon a healthy physiological balance inter-individually among the members composing the social community. The analysis of groups, or of the inter-reactions occurring among individuals socially, has made plain experimentally that repression and the neurosis are the result of inter-individual sensations of right and wrong as sponsored by our normal standards or by standards which lack a scientific criterion. What applies to the negative reaction of the neurotic in response to unstandardized sensations of right and wrong applies to the positive reaction of the criminal with his equally arbitrary and unstandardized criteria.

It is of deep significance sociologically that both neurosis and trespass, insanity and crime, with their basic lack of scientific criteria, are the direct outcome of our normal standards of right and wrong. We are reversing the direction of our inquiry, therefore, when we seek to investigate the social *symptom* expressed in crime rather than the disturbed physiological tensions represented in our *normal standards* of right and wrong. It is in our courts of law that we may realize most poignantly the operation of normal standards as they affect our normal evaluations of repression and trespass, of insanity and crime.

HAROLD E. BURTT. *Advertising in Flats* vs. *Standards from the Psychological Standpoint.*

'Flats' are frequently alleged to be far superior to 'standards' because the reader must turn to the later pages to finish the story and will therefore see the advertisements. The question has not been investigated experimentally except by Münsterberg and his technique approached the practical problem rather indirectly. In the present study dummy magazines were made up in pairs, each containing 25 pages of reading matter and 20 full-page advertisements. In one member of the pair the advertisements are grouped in two 'sections' with the articles in between, while in the other the same material is used but after five initial pages of reading matter, alternate pages are devoted to advertisements. The subject 'looks through' the dummy for ten minutes and is then tested for recall and recognition in conventional fashion. Each subject is tested with one dummy of each sort. Preliminary results indicate no outstanding superiority for the 'flats.'

Harold E. Burtt. *An Evaluation of Laboratory Methods for the Detection of Crime.*

The association reaction has been predominantly a laboratory, rather than a practical, experiment, but, where used with real offenders, it has proved successful even with rather brief analysis of data. An important problem for study is the effect of giving the stimulus words rapidly in the manner of Crossland as compared with the usual slower method. The difficulty of obtaining crucial stimulus words renders the method of little value unless applied rather early in the investigation of a case.

Breathing, especially the I/E ratio, has been used almost exclusively in the laboratory where it is difficult to produce genuine attitudes of deception. Even here some experiments have been reasonably successful in detecting truth or falsehood. This technique should be applied to real offenders at the first opportunity.

Blood-pressure measurements have been more generally successful than the others. The interpretation of graphic records such as Larsen's, while quite successful, has been largely qualitative. Quantitative standards are ultimately desirable.

At present the methods need an expert to interpret them.

Whether they should ultimately be more ' fool-proof ' is a moot question.

Other techniques should be exploited, *e.g.* involuntary movements.

HAROLD E. BURTT. *Psychological Techniques for the Study of Highway Safety.*

The larger problem involves a comprehensive analysis of safety from the psychological standpoint, including such things as individual differences in ability to drive, the formulation of statutes for licensing drivers, and the rôle of habit in safe driving. The method thus far has involved devising a considerable number of techniques for measuring psychomotor capacity, giving them to a normal group of students, some of whom have had, and some of whom have not had, accidents, and also to selected groups, such as drivers of delivery trucks who have demonstrated their skill, and traffic offenders who have had accidents and have been in court and have thereby demonstrated their inefficiency.

The following are the principal variables studied. (1) Eye-hand-foot coördination; pointers are moving from right to left, one under the control of the subject by means of a steering wheel. When the pointers are aligned at a particular region in the middle of the field, pressing the brake and clutch will stop the apparatus. (2) Lectometer; the subject by operating tumbler switches copies a series of dots—actually letters of the blind alphabet, but upside down and with left and right reversed. (3) Pursuit-meter; the subject holds a stylus on a moving contact which follows a complex pathway. (4) Polyergometer; the subject pumps air into two tubes with hand levers and keeps two Cartesian divers from touching the top or bottom of the tube. (5) Simple visual reaction to the disappearance of a light, and choice reaction to the disappearance of two lights in the margin of the visual field. (6) Conventional motor tests; three-hole, steadiness and tapping test with somewhat modified procedures. (7) Judgment of distance and velocity; a moving pointer disappears behind a screen and must be stopped at a designated point by the subject pressing a key. (8) Emotional stability; galvanic reflex and also breathing and rate of addition while a revolver is fired. (9) Social and biographical data, such as the number of positions held, rent, salary, insurance, credit reliability, *etc.*

The reliability of some of the measurements is high and some of the intercorrelations are low. There are preliminary indications of sex differences and also of significant differences between subjects who have had accidents and those who have not.

M. W. Calkins. *Common Ground in Contemporary Psychology.*

The radical differences in point of view of modern psychologists have constituted one of the scandals of contemporary science. There are, however, encouraging signs of present-day *rapprochement.* Common to several different systems are, first, the opposition to atomism with its positive corollary, the doctrine that psychology should concern itself not primarily with processes, states, or 'contents,' but with integrating conscious wholes; second, the conviction that every such conscious existent should be studied in its responses and relations to the environment; the theory, finally, that psychology is a social science, dealing with these integrating, conscious beings in reaction on an environment social as well as physical.

In my opinion, the system which fuses all these tendencies with least injury to the susceptibilities of other theories is that form of personalistic psychology which is upheld by Stern and by William McDougall—to name no others. On this theory, psychology is the science of the conscious organism. It studies not only purely conscious reactions—perceiving, thinking, feeling, willing, and affirming—but biological or psychosomatic responses as well: adaptation, development, and the rest. I dare to entertain the hope that psychologists will yet unite in adopting this theory at least as a common working hypothesis. Behaviorists will find in it their basal, positive conception—that of the organism in reaction on its environment; self-psychologists will retain their conscious being and *Gestaltists* their integrated wholes. 'Existential' (or atomistic) psychologists, finally, will still find use for their analytic method. Of course, there will be concessions also. Existential psychologists will be obliged to recognize an experiencer and behaviorists to admit consciousness into psychology; self-psychologists will yield their conception of self as purely psychic and *Gestaltists* their virtual outlawry of analysis. But in my opinion the adoption of such a theory will entail the loss of no concrete observation and no positive conception.[1]

M. W. CALKINS. *The Dangerous Ambiguity of the Term Meaning.*

It is of first importance to differentiate the widely varying senses in which the term *meaning* is employed by contemporary psychologists. At least seven of these may be distinguished and grouped roughly as follows: *meaning* is conceived in the first place (I) as a wholly unanalyzable experience and either (1) further described as awareness of objects or (2) treated merely as a unique, elemental, and mysterious sort of consciousness. More often, however, psychologists regard meaning (II) as an analyzable experience, either cognitional or volitional. Of cognitional uses there are four: the conception of *meaning* (3) as supplemental imagination (context); (4) as relational experience of any type; (5) as signification; and (6) as implication. The final use of the term is (7) as volitional experience, purposing or affirming.

We have to compare and appraise these conceptions. Either use of *meaning* in the sense of unanalyzable experience is to be rejected as unscientific since it is part of the business of any science to analyze the conceptions which it employs. For a different reason, *meaning* should not be used in the sense (3) of imaginal context: the reason, namely, that such supplemental imagery varies with the individual, whereas meanings are fairly uniform. And, finally, the use of *meaning* as a synonym for (4) thinking, or relational consciousness in general, too greatly diverges from popular usage.

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[1] For development of this position cf. a paper by the writer: Converging lines in contemporary psychology, *Brit. J. Psychol.*, 16, 1926, 171–179.

This leaves us with three defensible senses of the term. But only one of them, the definition of *meaning* as volitional consciousness, is a strictly psychological conception. *Meaning* as implication (6) is chiefly a concern of logic; *meaning,* in the most important of all its senses, as signification (5) is not a term peculiar to psychology. And even *meaning* in the technically justified sense of purposing and affirming may, as is evident, be replaced by other terms. There seems good reason, accordingly, for excluding so slippery and ambiguous a term from the technical vocabulary of the psychologist.[1]

M. W. CALKINS and E. A. McC. GAMBLE. *The Self-Psychology of the Psychoanalysts.*

The thesis of this paper is that the underlying doctrine of the psychoanalysts is essentially a form of self-psychology; in other words, of psychology conceived as science of the conscious self in relation to its environment. The following specific doctrines are adduced as illustrations of the use made by psychoanalysts, however unwittingly, of the categories of self-psychology: Jung's distinction between introversion and extroversion, the turning of the libido toward the subject or away from it; the contrast drawn by Adler both between "will to power" and "social feeling," and also between "superiority" and "inferiority" feeling; Freud's opposition of egoistic to social impulses and his doctrine of the "censor" (of late more literally conceived as the ego) who determines or controls the content of consciousness.

More briefly the paper considers the conception of the Unconscious, that part of psychoanalytic theory seemingly incompatible with self-psychology. The Unconscious, it is pointed out, is conceived by the psychoanalysts in three distinct but incompletely differentiated fashions: (1) as unconscious mental process; (2) as literally Unconscious Mind; (3) as dissociated personality. The first two of these conceptions are characterized as untenable;

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[1] This paper is condensed from the paper by the writer, The ambiguous concept: meaning. *Amer. J. of Psychol.,* 39, 1927, 7–22.

and it is readily shown that, according to the third of them, the supposed Unconscious really turns out to be a kind of self.

E. H. Cameron. *The Contribution of Psychology to Educational Methodology.*

The results of psychological investigation cannot directly determine the choice of the most desirable methods of instruction. For example, the choice of the project method as opposed to more formal methods, and of psychological as opposed to logical methods, implies the adoption of standards of value that are not subject to determination by means of psychological experimentation or analysis. Choice of methods is also complicated by questions of selection of curricular material, school organization, and the like. Nevertheless, psychology has contributed much to the definition of these problems, and to economy in learning, whenever the more specific aims of instruction may be taken for granted. It furnishes the basis of criticism for the rejection of inadequate methods, and encourages school-room experimentation in line with more correct methods. These points of view are illustrated by the way in which the psychology of individual differences and of transfer of training have affected school-room practice, and by the application of pyschological principles to the elementary school subjects.

C. Macfie Campbell. *Schizophrenia and Environmental Factors.*

In face of the manifold clinical pictures presented by the so-called functional psychoses, a preliminary classification distributes the majority of the cases between two large groups, the affective and the schizophrenic; the former is on the whole benign, the latter malignant. With regard to the causative factors in the schizophrenic group there is serious divergence of opinion; some consider that the symptoms are essentially symptomatic of some underlying somatic disorder, others would formulate the clinical pictures as examples of a disturbance of adaptation to be formulated in terms of psychological functions and of environmental stresses and strains. Some case material seems to justify an emphasis on the influence of environmental factors in the evolution of the case, whether by way of conditioning the personality or of precipitating a difficult situation.

Ivy G. Campbell. *Objective Forms in Aesthetics.*

The aesthetic consciousness regards its object as enclosed, *i.e.* as complete in itself, with no reference beyond. This is psychologically possible because the principles which are taken as making up the unity of the beautiful object are objectively determined and not dependent on meaning or associative processes of the subject. Here is a difference between the aesthetic consciousness and those other types of consciousness in which associations do play a rôle.

Psychological experimentation has shown that there are such objectively determined principles: *e.g.* Wertheimer has shown that similarity, nearness, and proportionate distance are such objective principles at the basis of our forming of groups in a sensory field, and Bahnsen has shown a comparable thing in regard to symmetry. It is the object of this paper to report experiments which the writer has performed and which show other objective principles functioning to determine the unity of an aesthetic field. These principles follow:

I. *Principle of the dominance of certain forms.* Such forms when used in a work of art dictate the organization of the field. This is shown by (a) experiments using as material (i) photographs of certain works of art and (ii) skeleton designs of these same works, (b) series of analyses of the compositions of originals by Greek vase painters, by Michel Angelo, by German artists, and especially of etchings by Dürer.

II. *Tendency of certain forms to complete their contours* when significant parts are given.

III. *Principles of 'seen' movement in works of art,* as shown in such works of art as the Parthenon frieze and the Michel Angelo Sistine Chapel paintings and in experiments using skeleton designs of these works of art.

IV. *Other principles which unify an aesthetic field.*

These principles in the above four groups are on the side of what are generally called the formal factors in a work of art, but experiments in progress seem to show that the content side, especially the emotional content, is also objectively determined. Observations and experiments in emotional expressiveness indicate that this side, too, is based upon objective principles and not upon subjective associational ones.

The argument of this paper is then that both the sensory and emotional factors present in the aesthetic consciousness are objectively and not subjectively determined.

IVY G. CAMPBELL. *Meaning.*

The meaning of an object or experience is ***not*** its context, particularly when context means supplementary imagery which has become associated through past experience. On the contrary, only when added factors such as supplementary imagery have become so intimately fused with the object that there is identity can one say that this added factor gives or is the meaning of the object. This conclusion has been reached from the study of the results of a series of experiments which it is the object of this paper to report.

In some experiments, extending over several months, there were repeated recalls of a stimulus (a chart on which nine differently colored nonsense figures were drawn) which had been exposed for thirty seconds. These recalls were made by drawings of the chart and at the same time full and trained introspections upon the methods whereby these recalls were accomplished. The recalls show that at first recall of the items was effected by means of supplementary images which had been added to them. These supplementary images were really of 'beyond-objects,' *e.g.* one item gives rise to a supplementary image (visual, vocomotor, *etc.*) of a "red mushroom" (the 'beyond-object'). One might think that this was the meaning of the item but such is not the case, for gradually, as repeated recalls were made, this additive process of 'beyond-objects' to items either dropped out entirely or changed into a process of identifying. In the first case all reference to 'beyond-objects' drops out, what these objects were is forgotten, and the items of the chart are recalled through direct imagery of themselves. In the second case the item *becomes,* is taken *to be* what had before been a 'beyond-object.' These experiments show that, in dealing with novel material, mind tends to use mediate processes, to depend upon its apperceptive mass (especially through the principle of similarity) until it can use more immediate processes. When this is accomplished, context in the form of additive factors is done away with and identity then functions. By *identity* is meant, *e.g.,* that a perceptually given orange has its meaning intrinsic to the percept and not as some supplementary factor—imaginal or other. So, also, it is in these memory experiments. Expressed otherwise, one may say that meaning is as directly given as are sensory organizations. B. Other experiments show that, where meaning *is* thus identical in the sense indicated in A, the rate of learning for such meaningful material is more rapid than where such meaning has not been attained. C. Still other experiments show that the recognition-time of objects, which, through controlled conditions of experiment, have attained such identity-meaning, is shorter than for objects which have not thus attained it. When the relation is still additive the reaction time is longer than where it is one of identity.

This explanation of differences in reaction time can be extended to the results that have been attained in controlled association experiments: *e.g.,* the reaction time of 'opposites' is quicker than that of 'genus-species.' Mind seems to use more spontaneously and naturally the categories of opposition and similarity than it does those of classification.

Leonard Carmichael. *The Experimental Study of the Development of Behavior in Vertebrates.*

This paper presents the results of certain experimental studies of the development of behavior in vertebrates. An understanding of the relative importance of heredity and environment in determining any given act of behavior is fundamental for psychology. Behavior in the adult depends upon certain relationships between the structures of the body, of which the receptors, nervous system, and effectors are most important. A knowledge of the developmental course of these structures in the individual is necessary for a complete physiological psychology. Only by a study of this sort, for example, will the so-called 'instinct problem' be solved.

A review of the previous work upon this topic shows that in many cases it has been assumed that environmental stimulation and muscular response have been experimentally controlled, when as a matter of fact this has not been the case. In experiments by the present author it was shown that by the use of an anaesthetic it is possible definitely to control the external responses of developing embryos. The animal forms used in these studies were Amblystoma punctatum and Rana sylvatica. Further experiments exhibit a qualitative comparison of the behavior of organisms developed in a normal environment, and those developed while under the influence of an anaesthetic.

On the basis of the results of this experimental work, it is suggested that both heredity and environment are *interdependently* involved in the development of those structures of the body upon which behavior depends. It is further demonstrated that during certain periods organisms may be rendered inert and kept from the possibility of exercise without seriously retarding the development of functional ability as shown in later behavior. In all such cases, however, the environment can be shown at some point to have been essential in development.

L. CARMICHAEL, see also both T. C. HOLMES and H. SCHLOSBERG.

H. CARR, F. DAVIS, and F. M. SAUER. *The Relative Variability of Words and Nonsense Syllables.*

Ebbinghaus' dictum of the greater homogeneity of nonsense syllables, as compared with words, assumes that the learning scores of nonsense syllables are less variable and hence more reliable. This assumption involves two questions: the relative variability of the two materials from list to list, and their relative variability from individual to individual. In a first experiment, we tested the relative variability of twenty lists of the two materials for each of five subjects, and in a second experiment, the variability of twenty-five subjects for each of five lists of both materials. The lists were of the same length and were constructed on the same principles.

In both experiments the words exhibited the smaller measures of dispersion,—a fact that might be predicted from their smaller learning scores.

The differences between the individual means for words were much more reliable than for syllables.

The coefficients of list-to-list variability were much less for words than for syllables. Practice decreased these coefficients more for syllables than for words, and as a consequence the coefficients for the last ten lists were smaller for the nonsense material.

The coefficients of individual variability for the lists and the various items of the lists were slightly smaller for the nonsense syllables, but the statistical reliability of the difference is questionable.

Hulsey Cason. *The Origin and Nature of Common Annoyances.*

A collection of every-day annoyances, aversions, and irritations was made from a representative group of 659 subjects of both sexes and varying in age from 10 to 90. These 21,000 annoyances, including duplicates, were classified and counted, and 507 were selected for further study, by the following criteria: (1) frequency, (2) age distribution, (3) objectivity, (4) universality, (5) permanence, and (6) psychological significance. This list of annoyances includes all that are ordinarily encountered in every-day life.

Half of the annoyances were then graded by 625 subjects of both sexes between the ages of 10 and 90, and the other half were graded by a comparable group of 378 subjects. These 1,003 subjects used the following scale in grading each of the 507 annoyances: 3—extremely annoying, 2—moderately annoying, 1—slightly annoying, 0—not annoying, and X—have not been in the situation.

The subjects of each sex were sorted into four age groups: 10–25 years, 25–40, 40–60, and 60–80; and the corresponding eight mean scores were calculated for each annoyance. Some sample curves will be shown to indicate the scores for both sexes at different ages in the case of a few annoyances. Mean scores for individual subjects were also calculated and correlated with age, sex, height, weight, the thin and fat, health, whether married or unmarried, number of years married, number of children, formal education, occupation, and residence.

An attempt was made to explain 300 of the most important common annoyances with the aid of 7,200 explanations prepared by 535 additional subjects. The following principles of explanation were used: (1) unpleasant association, (2) interference with pleasant activity, (3) opposing ego tendency, (4) identification, (5) regression, (6) undue familiarity, (7) discards from the body, (8) inherited tendencies, and (9) customs, conventions, and taboos. No single principle is adequate to explain all of the annoyances, although practically all of them are learned. It is necessary to make some use of all forms of psychology, and in many cases several principles of explanation have been used to explain a single annoyance. Sample results will be given.[1]

JAMES MCKEEN CATTELL. *Psychology in America.* Address of the President of the Congress.

See pages 12–32; also *Science,* N.S. 70, 1929, 335–347.

SIEGEN K. CHOU. *A Quadrant Tachistoscope.*

A new Quadrant Tachistoscope with simultaneous voluntary maintenance of exposure, originally designed for research in

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[1] In this investigation I have received much assistance from my wife, Eloise Boeker Cason.

Chinese reading, can be adapted to a variety of tachistoscopic and bradyscopic researches and has the following advantages. (1) The exposure of the perceptual material approximates most nearly normal visual perception. (2) The exposure is possible along both the vertical and the horizontal axes. (3) The time of exposure is capable of objective record by means of either a chronoscope or a short-interval stop-watch. (4) The changing and releasing of the perceptual cards is controlled by simply pushing indirectly a lever or turning directly a shaft in such quick automatic action that exposures can be made as fast as one can continuously do so. (5) The opening and closing of the shutters can be either kept constant or controlled by *E* or *O*, or both. This makes possible a perhaps new technique in tachistoscopic research, in which the *simultaneous voluntary maintenance of exposure* gives rise to the preferable use of time-unit (reaction-time) instead of work-unit (amount per unit-time) as a measure.

There are several theoretical justifications for this procedure. (1) The time required to do a certain amount is a much more adequate and accurate measure than the amount done in a given time because there is no limit in the time that one may require to accomplish a given amount of work while there is always a certain minimum amount of work that one can accomplish. (2) The absolute decrease of, *e.g.*, number of words read per second cannot be taken as a direct measure of the effects of experimental factors upon speed in different individuals because this decrease is the least in the slowest reader while his increase in reading reaction-time is the greatest. (3) The measurement of a large number of reaction-times for evaluating a central measure meets the objection that the usual representative measure in terms of words read per second is in no sense a central measure of any *distribution* of separate measures (unless by photographing eye-movements) but is an abstraction in artificially divisible units from a single measure of larger unit. (4) The *simultaneous voluntary maintenance of exposure* is at the same time a non-discrete detractor, a constant check, and a continuous intensifier of the attention of *O*.

The apparatus consists essentially of four quadrant shutters pressing against one another in the form of a cross. The right and left pairs are able to open at the same time sidewise and the upper and lower pairs in the upward-downward direction. The quadrants are held together by springs and are electromagnetically operated through a four-arm switch by pressing down a finger-key.

ÉDOUARD CLAPARÈDE. *Esquisse historique des Congrès internationales de psychologie.* Address of the Permanent Secretary of the International Committee.

See pages 33–47.

ÉDOUARD CLAPARÈDE. *Théorie biologique du sommeil.*

L. F. CLAUSS. *Auszug aus den Ergebnissen der psychischen Anthropologie.*

Der psychologische Unterschied zwischen Rasse und Rasse ist ein *Unterschied des seelischen Stils, nicht der Eigenschaften.* Nicht, welche Eigenschaften ein Mensch besitzt, kennzeichnet ihn rassisch, sondern: welcher Stil in diesen Eigenschaften sich auswirkt. Nicht, *was* ein Mensch erlebt oder tut, kennzeichnet seine Rasse, sondern: *wie* (= in welchem " Stile ") er es erlebt oder tut.

Die Erlebens-Stile der Rassenseelen zu ergründen, erfordert ein langes Verweilen und enges Mitleben inmitten der Völker und sonstigen Gemeinschaften, aus denen das Material geschöpft wird: ein Mitleben, das zu einem *mimischen Sich-Einleben* in alle entscheidenden Erlebensgebiete der zu suchenden Typen führt. Einen Rassentypus " verstehen " heisst gleichsam: seine Rolle zu spielen vermögen auf der seelischen Bühne (= " mimische Methode ").

Da das Erleben des Menschen sich wahrnehmbar kundgibt in seinem Ausdruck, ist unsere Seelenforschung wesentlich Ausdrucksforschung. Insonderheit bildet das Antlitz mit seinem lebendigen Mienenspiel ein erstes und wichtigstes Untersuchungsfeld. Durch die Ausbildung einer Methode photographischer Erzeugung psychologisch wahrer Ausdrucksbilder ist es gelungen,

unbewusste, z. T. dem Auge nicht als solche erfassbare Ausdrucksphasen in Photogrammen festzuhalten und Abläufe solcher Phasen in "*mimischen Reihen*" niederzulegen. Diese Ausdrucksreihen bilden ein wichtigstes Forschungs- und Darstellungsmittel der *vergleichenden Ausdrucksforschung*. In stilkritischer Arbeit wurden bisher folgende Typen herausgestellt und in mimischen Reihen vorgeführt: (1) der Leistungstypus ("nordisch"), (2) der Darbietungstypus ("mittelländisch"), (3) der Berufungstypus ("wüstenländisch"), (4) der Erlösungstypus ("vorderasiatisch"), (5) der Enthebungstypus ("turanisch").

Ziel der Forschung ist die Findung einer *apriorischen Typologie* möglicher Erlebens-Stile. Als Leitfaden der Findung dient die faktische Fülle der empirisch gegebenen Typen.

Unsre Wissenschaft hat keinerlei Verwandtschaft zur naturkundlichen, vom Körper ausgehenden Anthropometrie. Die Verwandtschaft unserer Methode zur Arbeitsweise der Geometrie ist aufgezeigt: beide beruhen auf der exakten Intuition von Gestalt-Ideen. Die wissenschaftlichen Grundbegriffe der psychischen Anthropologie (als eines Zweiges der vergleichenden Ausdrucksforschung) sind erarbeitet. Der Begriff "Anlage" ist psychologisch aufgeklärt als planvolle Ordnung von Eigenschaften in ihrer Beziehung zum Stilgesetze. Das Phänomen der Ausdrucksprägung (durch Erziehung und Geschichte) wurde psychologisch durchleuchtet vornehmlich am Beispiel des jüdischen Ausdrucks. Wichtige Aufschlüsse ergaben sich für die Beziehungen zwischen Erlebnis und Ausdruck, für die Stilbeziehungen zwischen Seele und Leib. Erscheinungen wie Stilwechsel im Ausdruck und gebrochener Ausdruck deuten vor auf eine künftige Psychologie der Stilmischungen.[1]

G. E. Coghill. *The Genetic Interrelation of Instinctive Behavior and Reflexes.*

Upon the conventional hypothesis that instinctive behavior is a fusion or integration of reflexes it must be assumed that the

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[1] Cf. L. F. Clauss, *Von Seele und Antlitz der Rassen und Völker*, München, 1929.

act of integration is either fortuitous or effected by some agency, extrinsic or intrinsic. If this agency be extrinsic, behavior is fatalistic or vitalistic. If vitalistic in the ordinary sense, it is extra-scientific. If fatalistic, it gives no place for that individual responsibility which seems to be basic to a social order. If, on the other hand, the integrating agency is intrinsic, it is subject to scientific inquiry and may be found to be consistent with individual freedom. As a matter of fact, in the genesis of behavior this agency is found to be the organism as a whole.

All behavior patterns begin, in so far as the development of behavior is known, as total reactions. They become partial or local in the normal individual only overtly. The so-called instinctive reaction of the newly-born infant to a loud noise does not differ materially from the reaction of a young fetus to a touch on the eyelid; but the latter becomes a local reflex by the time of birth. This change is brought about by that progressive restriction of the zone of stimulation and the motor response which is appropriate to the organism as a whole. So also in the reaction to sound in the post-natal life there is progressive concentration or analysis of the receptor function appropriate to the total organism.

In genesis, therefore, the instinct and the reflex are not distinct categories of behavior. They are both subject to the same dominance of the total organism in the restriction or analysis of the stimulogenous zone and in the individuation of overtly partial patterns within the total action system. Any interpretation of native behavior, instinctive or reflex, must, therefore, reckon with the capacity of the organism as a whole to regulate a progressive individuation within both the sensory and the motor fields according to its own requirements of adaptation to its environment.

G. E. Coghill. *The Development of Half-Centers in Relation to the Question of Antagonism in Reflexes.*

That type of organization which has been called "half-centers" by Graham Brown is found in its simplest terms in the primary motor mechanism of Amblystoma in relation to the lateral halves of the effector system. In the development of motility in this system there is the inherent possibility of antagonism in so far as structure is concerned, but there is rarely if ever any evidence of an antagonism that interferes with the appropriate coördination of movement. The movements concerned are lateral flexures or bends of the body of the animal along its longitudinal axis.

These movements are at first slow but their speed increases with age, and eventually they are performed in alternate directions in exceedingly rapid succession. The center of control of these movements begins as a nervous matrix of relatively uniform structure that spreads across the median plane of the central nervous system ventrally. As movements become more rapid and, as would appear, the chance of antagonism increases, this originally unitary center divides longitudinally into two lateral halves each of which is in direct control of the effectors on its own side. But neither of the 'half-centers' loses all its influence over the contralateral effectors, for as the two primary motor columns of cells separate from each other and become the two 'half-centers,' functional contact between them is maintained by the growth of collaterals from the neurones of the motor tract of one side through commissural connections in relation with the motor neurones of the other side. These collaterals are apparently inhibitory. Their inhibitory action tends to prevent antagonism, and facilitates the speeding up of movements which effect locomotion.

In the application of these observations to the interpretation of the function of the nervous system in the development of reflexes, and behavior in general, the important consideration is that the collaterals in question grow out from nerve cells after the cells have begun to function as conductors, and that so long as there is growth of dendrites and axone terminals in the central nervous system it must participate in the facilitation of appropriate responses and, therefore, in the adaptation of the organism to its environment.

G. E. Coghill. *Individuation* vs. *Integration in the Development of Behavior.*

The purpose of this paper is to show that the behavior pattern of Amblystoma develops by the expansion of a primarily integrated total pattern in which the reflexes develop by a process of individuation, and that, in so far as movement in the first six months of fetal life of man has been observed, human behavior develops according to the same principle.

The development of behavior in Amblystoma from the earliest movement to the establishment of the definitive behavior pattern will be described in its essential features, and the neuro-anatomic basis for the order of development which is observed will be explained.

The earliest local reflexes to exteroceptive stimulation are conditioned by specific postural reactions. Their appearance is anticipated by a period in which the localized stimulus appropriate to the reflex inhibits the total reaction. The so-called conditioned reflex probably does not differ from the ordinary reflex in its mode of origin; for Pavlov and his associates find that some of their dogs, when the experiment is applied to them, go to sleep. This is a total reaction in the form of inhibition, similar to the inhibitory phase in the development of reflexes in Amblystoma.

There are records of the movements of fifty or more young human fetuses which give information on the early development of behavior in man. These fragments of man's history fit perfectly into the plan which has been demonstrated in detail for Amblystoma. The oral reflex, eyelid reflex, anal reflex, plantar reflex and respiratory movements clearly arise by a process of individuation from much larger patterns.

The development of behavior must be regarded not as a synthetic process, but as a process of analysis of a total, primarily integrated and constantly expanding pattern.

T. W. Cook, see R. P. Angier.

Clara Chassell Cooper. *The Relation between Morality and Intellect.*

This research is a compendium of evidence as to the relation between morality and intellect contributed by psychology, criminology, and sociology. It has three major divisions.

Part I tabulates and synthesizes studies made by many investigators as to the relation between delinquency and mental inferiority, and between moral character and intelligence.

Part II reports studies made by the writer as to the relation between moral and intellectual traits, with 595 college students rated by faculty members in three traits, and 176 college students rated by fellow-students in nine traits, as subjects; and supplementary studies with college marks and extra-curricular activities as measures of intelligence.

Part III reports studies made by the writer as to the relation between conduct and intelligence, with approximately 900 school children measured by citizenship and intelligence tests, as subjects.

The following countries are represented by the various types of evidence presented.

Reports of the *Prevalence of Delinquency:* United States, Great Britain, Belgium.

Estimates of the *Prevalence of Mental Deficiency:* United States, Great Britain, Germany, Great Britain and Ireland, Sweden, Central Europe.

Ratings as to *Intelligence* (Abstract Intelligence, Social Intelligence, Abstract and Social Intelligence): United States, Great Britain, Europe.

Reports of *Educational Status* (The Prevalence of Illiteracy, The Amount of Schooling, School Progress, Educational Achievement): United States, Great Britain, Germany, United States and Canada, Porto Rico, Philippine Islands, France.

Reports of *Extra-Curricular Activities:* United States.

Results of *Intelligence Tests* (Tests of verbal abstract intelligence, Army mental tests, tests of non-verbal concrete intelligence, tests of mechanical intelligence): United States, Canada, Great Britain, Australia.

The assembled results of the research, almost without exception, reveal a relation between morality and intellect in restricted groups whatever the type of evidence presented, albeit the degree of relationship disclosed varies with the group investigated and the type of evidence under consideration. The weighted means of the coefficients for the several groups, together with the number of coefficients represented, are as follows:

Delinquent Groups: Feeble-minded groups, 8, 0.53; adult criminals, 65, 0.29; juvenile delinquents, 96, 0.35; sex offenders, 17, 0.45; alcoholics, 2, 0.76.

Non-Delinquent Groups: General population, 2, 0.72; royalty, 1, 0.34; army rcruits, 1, 0.64; college graduates, 4, 0.31; college students, 282, 0.26; school children, 200, 0.31; Boy Scouts, 2, 0.03.

The central tendencies of the coefficients thus range from 0.26 to 0.45 for the groups represented by adequate data for defining the relationship under investigation.

CLARA CHASSELL COOPER. *Standardization of Method of Report of Tests.*

In pursuance of a research on the relation between morality and intellect the writer has recently tabulated in a uniform manner the results of a large number of previous studies, and also the results of her own investigations. The diverse types of data represented in the tabular reviews include (1) reports of the prevalence of delinquency in feeble-minded and non-feeble-minded groups; (2) estimates of the prevalence of mental deficiency in delinquent and non-delinquent groups; (3) ratings as to intelligence in non-delinquent groups; (4) reports of educational status in delinquent and non-delinquent groups; (5) reports of extra-curricular activities in non-delinquent groups; and (6) results of intelligence tests in delinquent and non-delinquent groups.

The results of intelligence tests tabulated were assembled from the following sources: (1) previous non-correlational and correlational studies of the relation between delinquency and mental inferiority; (2) previous correlational studies of the relation between moral character and intelligence; and (3) an original correlational investigation of the relation between conduct and intelligence in the case of elementary-school pupils.

The uniformity in the tabulation was accomplished by the selection from the sources, regardless of the data under consideration, of the following information: authority, date of investigation, date of publication, group, number of cases, and (for noncorrelational studies) selected findings of critical import and diagnostic significance, or (for correlational studies) measures, and detailed information regarding the coefficient.

The difficulties encountered in the compilation have led the writer to formulate certain suggestions, including the following.

1. That investigators in psychology and the allied sciences adopt a uniform tabular method of report, including the prescribed items enumerated above, or, preferably, prescribed minimum essentials of report formulated by an authorized standardization committee.
2. That, in so far as a uniform tabular method of report is appropriate and economical in application to their particular problems, investigators employ the prescribed form as the essential method of reporting their scientific investigations.
3. That, after official action with respect to standardization has been taken by the appropriate associations of scientists, the editors of research publications as far as practicable postpone the publication of inadequate manuscripts submitted to them until the authors shall have supplied the prescribed minimum essentials of report.

CLARA CHASSELL COOPER and LAURA CHASSELL TOOPS. *Resolution Concerning Reviews of the Literature on Mental Tests.*

[The following resolution was presented to the symposium on Mental Tests and was discussed favorably by the group present. No formal action was taken upon it.]

Whereas, certain facts should be a routine matter of report in many types of psychological investigation,—possibly including in the case of correlational studies authority, date of investigation, date of publication, group, number of cases, measures, and detailed information regarding the correlational result, and in the case of non-correlational studies authority, date of investigation, date of publication, group, number of cases, and selected findings of critical import and diagnostic significance; and

Whereas, these facts are frequently omitted in reviews of the literature, and even in the accounts of original investigations; and

Whereas, even if reported, these facts are frequently obscured or limited in usefulness by the manner of presentation; and

Whereas, in the present unstandardized condition of reporting, compilers are left to their own devices in presenting reviews of the literature; and

Whereas, reviews formulated under such circumstances are usually inadequate for the use of future investigators, and thus necessitate much duplication of effort; and

Whereas, a uniform tabular method of report is both practicable and economical for many types of research, not only in the case of the account of an original investigation, but also in the case of subsequent reviews thereof, and at the same time does not preclude the publication of distributions of original data nor of such additional information as the writer may see fit to include; and

Whereas, it is believed that devices to insure greater adequacy in the accounts of original investigations and to lighten the task of the reviewer may have important effects in economizing effort in investigation; therefore, be it

Resolved, That the Symposium on Mental Tests of the Ninth International Congress of Psychology call attention of the Congress and other psychological associations to the desirability of improving and standardizing the method of reporting scientific investigations, and that they recommend that the whole matter of essentials of report and publication might well be considered by a committee; and be it further

Resolved, That a copy of this resolution be incorporated in the Proceedings of the Congress.

W. J. Cooper. *Address of the Representative of the United States Government.*

See pages 48 f.

J. E. Coover. *Secondary Criteria and Threshold Determination.*

Finding a sensory or a discrimination threshold is commonly regarded as merely a matter of running the data through Urban's or some other statistical mill, and recent discussion has turned upon the formula or mathematical process that best fits the frequencies. I wish to display a source of error that affects the frequencies themselves, and that consequently has a bearing both upon the threshold determination and the selection of the best descriptive formula.

The research consists of nineteen sets of data, of approximately 800 judgments each, from nine reagents. Judgments refer to visual stimuli provided by three test objects drawn in India ink (broken black circle, grating, black disc with eccentric white spot), for which the variable was distance in meters, and by the Ives-Cobb ophthalmological test instrument which presents a luminous grid of lines the separation of which may be varied in equal amounts of arc of the visual angle, for which the constant was a distance of 7.45 m. Judgments were delivered on the direction of the critical element (eight directions for the broken circle and the disc; four for the gratings) and in three grades of certainty: (3) "absolutely certain," (2) "fairly certain," (1) "doubtful, some sensory basis," and (0) "guess, no sensory basis." For the three grades of certainty, median $R = 99.5, 82.5, 55\%$. Median thresholds in visual angle, estimated by extrapolation of frequencies $= 45'', 39'', 36''$; corresponding retinal image, about 3.7, 3.3, 3.0 microns. Fritch's average inter-conal distance is 3 microns. Hence the threshold of all judgments (not guesses) reaches down to the resolving power of the eye, yet below this point guesses (and low grade judgments) show perceptual potency that cannot depend upon the critical criteria.

The evidence lies in the facts that (1) differences between frequencies show bi-modality indicative of heterogeneity of data, that (2) lower modes fall below 3 microns, and that (3) graphic and verbal descriptions of stimuli at each variable and for each grade of judgment reveal the secondary criteria in characteristic detail. The secondary criteria reach up (but rarely) into the second grade of judgment and affect the form of the curve and the determination of the threshold. Here as elsewhere, statistical procedure cannot be safely substituted for experiment.

H. A. Copeland, see J. P. Porter.

S. M. Corey, see C. R. Griffith.

S. A. Courtis. *Maturation Units for the Measurement of Growth.*

Suggestions for a new and universal system of measurement of growth phenomena in terms of the Gompertz law of growth.

1. Recent discoveries have shown (a) that growth is best defined as the progress of an individual or group toward a defined maturity under constant conditions; (b) that when so defined all growth curves may be precisely described in terms of a single variable, *i.e.* time, and two constants, *i.e.* starting point and rate of development; and (c) that the effect of each factor conditioning growth, whether acting singly or with others, may be measured by the resulting changes in the time required for maturation.

2. These discoveries make possible (a) the inductive derivation of the factors which condition growth, nature, quality, environment, and variability; (b) the objective definition of units for three of the four elements, namely, nature, quality, and variability; (c) the experimental determination of units for the remaining element, environment; and (d) the summarization of the effects of the various factors in terms of simple but universal laws.

3. One such maturation unit is in common use, without, however, there being any realization of the implications of such use. It is the intelligence quotient (IQ), which is the ratio of two

times,—mental age and chronological age. The proposal above is a clarification and an extension of the basic concepts involved in the use of units based on ratios of times.

4. The advantages and potentialities of such a system of units are unbelievably great. Comparisons, equivalents, predictions, and control are all much more simply achieved and yield much more consistent results than with the conventional systems of measurements. Maturation units offer new avenues of attack on age-old problems in all fields of growth.

S. A. Courtis. *General and Specific Factors from the Point of View of Growth.*

The formulation of simple mathematical ways of describing growth phenomena, and of measuring the effect of factors which condition growth makes possible a new method of attack in the investigation of general and specific factors. By the use of this formulation, it is possible to construct synthetic scores for educational tests which, while statistically 'perfect,' approximate actual scores so closely that distributions of them are indistinguishable from distributions of actual scores. The relationships between the factors determining these scores being known, this knowledge can be used to test the validity of the conventional statistical procedures upon which the theory of general and specific factors is based.

L. Crabbs, see D. Wechsler.

Harry W. Crane. *The Necessity of Psychometric Tests in the Study of Maladjustments.*

Qualitative as well as quantitative findings of psychometric tests are necessary for adequate understanding of many cases of maladjustments. Methods of reacting to test-situations are replicas of the patient's methods of reacting to ordinary life situations. A briefly summarized case with a preliminary interpretation on the bases of the maladjustment symptomatology, history, and personal interviews is presented. The inadequacy of this preliminary interpretation in this case is shown by an analysis of psychometric findings, both qualitative and quantitative, for various tests. The case material presented further demonstrates that the giving of numerous tests may make possible the eliciting, through different formulations and materials, of characteristic defects in methods of meeting life situations, as well as in other capacities.

HARRY W. CRANE. *The Limitations of Psychometrics in Clinical Practice.*

Psychometrics may be defined as the technique of measuring reaction patterns and capacities of human beings, or of devising methods for such measurements. Clinical psychology is much broader in function. It aims not only at knowing to what extent an individual may possess various reaction patterns and capacities, but also their etiology. It also attempts to ascertain how they are interorganized in the particular individual. It is within the scope of clinical psychology to study adjustment difficulties; the methods of readjusting; and to assist in the application of these methods. Psychometry is to Clinical Psychology what optometry is to ophthalmology. There is a danger of neglecting such distinctions in clinical practice. The danger lies in a failure to recognize the limitations of psychometrics in clinical practice, due to the fact that they give only quantitative and not qualitative data. The main body of the paper consists in supporting the position that the qualitative data secured by detailed recording of responses to all parts of the tests are equally, if not more, important than the quantitative data secured from the test as a whole. This is done by comparing the two types of data from the records of a number of cases seen in clinical practice.

H. R. CROSLAND. *Prior Knowledge and Practice* vs. *Other Variables in the Reading of Proof.*

Two experiments, on two different days, have been done on 115 subjects. One consisted in the reading of prepared proof with the purpose of discovering and noting all errors as quickly as possible; the other consisted in the reading of prepared matter, containing no errors, in the reader's usual speed, with only time records recorded. In both, the student-subjects were assembled together in a large class-room. In both tests three sets of galley proofs, printed on ordinary news-print paper, in 9-point-body Roman type, were employed. The sheets were white, green and peach in color. All sheets, in the proof-reading test, contained identical errors. These, prearranged for the purpose, were of 10 sorts, 4 to a sort, making a total of 40 per sheet. They were distributed 10 errors to each horizontal quarter of the sheet and in the order of 10, 9, 9, and 12 in the vertical quarters, respectively, from left to right. The class was divided at random into three numerically equal sub-groups. The first section, as trial one, read the white sheets; section two, for this trial, read the green sheets; and the third section read the peach sheets. From then on the sheets, by color, were rotated among the three groups of subjects until all had been read. No subject read the same color of proof-sheet twice; and every subject read the same matter, with identical errors, three times. All subjects eventually read the same sheets but in different temporal orders.

When all sheets of a given trial, irrespective of color, are grouped together, significant differences between the mean scores, as between the three trials, are revealed, both for the sub-groups of subjects and for the entire 115 subjects. For all subjects the mean error scores for the three trials in order were: 16.6, 14.7, and 13.8. Grouping the sheets, irrespective of trial but according to color, we obtain the following mean error scores: whites, 14.7; greens, 15.2; and peaches, 15.2. A glance at these values reveals that the factor of prior knowledge and practice is more important than the color of sheet in provoking error. However, the difference between the second and third trials is not as great as between the first and second readings. Likewise, the differences in mean time scores, for the three trials in order, are shown in the following: first, 348 secs.; second, 282 secs.; and third, 241 secs. Similarly the differences in mean time scores for the sheets by colors are shown by: whites, 293 secs.; greens, 288 secs.; and peaches, 283 secs. The differences are far greater by trials than by colors of sheets. Such large differences, however, in mean time scores are not proportionately reflected in a reduction in errors.

Reliability coefficients have been determined in a number of ways. They are all, for the time scores as well as the error data, in excess of Kelley's minimum coefficient of 0.4. They range from 0.45 to 0.71. Such computations as have been done demonstrate experimentally what is the most desirable method of computing reliability in this work. The highest coefficient was 0.71, and was obtained as between 1st and 4th as against the 2d and 3d vertical quarter white sheet error scores. For each of the other colors this grouping of quarters into halves furnishes the highest half-half correlation, although the coefficient between the 1st and 2d vertical halves is not much lower. When horizontal quarter-sheet error scores are grouped into halves, the highest reliability results from the 1st and 3d as against the 2d and 4th quarters.

ELMER CULLER. *An Empirical Study of Zero and Negative Intelligence.*

A variety of performances or abilities, differing widely in nature and intellectual quality, were placed before competent judges. They were charged to decide what *degree of intelligence* is needed in performing every act as described, and to rank them accordingly. These ratings were reduced to a scale, centering near zero and ranging widely on either side; from them are drawn the facts and principles below.

Facts. (1) Zero of intelligence, commonly regarded as a nether limit below which no response may possibly fall, lies *far above* the inferior end of our distributions. This zero is *absolute,* not arbitrary; the lowest samples of behavior from other sources (cf. Thorndike's "Does not try to pull off his own fingers or toes") locate just above our zero and far above negative acts.

(2) Negative acts (and zero) can be scaled as reliably (same standard error) as positive.

(3) Negative and positive ranges are about equal.

Principles. (1) When gaging intelligence of any act (human or animal), we assume to know what the actor is seeking or what the situation implies (satisfaction of hunger, escape from danger, winning a promotion, designing a machine); and then evaluate its intellectual quality by its relevance for that purpose. However defined, intelligence is a vector, wherein *direction* is coördinate with *magnitude.*

(2) If behavior which meets the actor's need or helps toward his goal be *positively* intelligent, then acts which impede or thwart his progress, leaving him worse-to-do than before, must clearly be *negative.*

(3) Any true measure of intelligence must incorporate these negative (maladaptive) factors. When asked "20 is 5/4 times what number?" X answers 25 (20 times 5/4). This reply is a summation of two elements: one positive (ability to multiply) and one negative (failure to divide); its net worth being their algebraic sum.

(4) The acts of a single individual cover an appreciable range. The mean level of his performance may be far above zero, but on occasion he is likely to fall below; the nether end of his activity-distribution will then be sub-zero.

(5) Zero-behavior differs from negative just as ignorance from misinformation; to have no money is zero, to be in debt is negative. By treating assets and ignoring liabilities, the standard mental tests give a distorted picture of intelligence.

The above principles have thus far been applied only to crude methods (ranking); they are now being worked into actual tests.

GEORGE BARTON CUTTEN. *Visions in the War.*

Conditions in the late war were ripe for extraordinary psychical experiences. Hostilities had barely started before various startling psychic phenomena began to appear; and prominent and early among these were the "Angels of Mons."

Among other objects of controversy in connection with this experience is that of origin, and one journalist, who wrote a most dramatic and moving tale about the retreat from Mons, has been bold enough to shoulder the whole responsibility for its angels. Mr. Arthur Machen, in a letter to the *Evening News* (London), tells of a short story called "The Bowman," published in the same journal on September 29, 1914, about one month after the retreat from Mons. This would seem to settle the matter and stamp its origin as pure fiction but fiction so appealing to certain innate desires as to be repeated and objectified by the readers of the *News*. Some, however, who have investigated the matter, claim that the stories were widely current in France at the actual time of the retreat from Mons.

The content of the vision varies with different people. Few seem to have beheld the bowmen, but many saw angels with wings, others saw St. George mounted on his charger, and still others seem to have seen only a bright flash. The French soldiers who saw the vision at Mons beheld not St. George, but Joan of Arc. All agree, however, that at the moment the vision appeared the German onslaught received a check.

Under the conditions, especially with the traditions concerning St. George and the memory which Tommy Atkins had of him on the reverse side of the sovereign, it is not strange that many describe the vision as that of the patron saint in golden armor.

It might be well for us to note one other vision which was frequently seen and often mentioned. This was called "The White Comrade." Both French and English profess to have had this vision, but it was more individual than that of the "Angels of Mons." "The White Comrade" made his appearance after every severe engagement and succored the wounded, and especially the dying.

This vision seems to be more easily explained than the "Angels of Mons." White-robed surgeons and nurses would furnish the suggestion of Jesus, so often pictured in white garments and presented as one who helps those sorely in need, and unconsciousness or partial consciousness caused by wounds or anesthetic would provide well known conditions for hallucinations, or for confused memory at a later date. This vision had the possibility of becoming far more widespread than the first one, for it was not limited to a particular time. The wounded would look for it, and often see it.

In later years, when psychological research has been criticizing the most intimate experiences of religion, as well as other facts of every day life, we have wished that we might have the opportunity of examining some of the persons who have claimed to have had visions in the past. The case of the "Angels of Mons" and " The White Comrade " have given us this opportunity, but we do not seem to have profited much by it.

Chester W. Darrow. *The Electrical, Circulatory, Secretory, and Thermal Reflexes of the Skin.*

Not only does the galvanic skin-reflex of the palm show a high correlation (r as high as .93) with simultaneous records of sweat secretion, but it frequently manifests a similar relation to concomitant records of thermal reactions in the skin as indicated by a delicate thermopile in the center of an electrode. Changes in the contact of the electrode with the skin are eliminated as determining factors by a pneumatic record of pressure. It is teleologically significant that momentary increases in the temperature of the skin should be associated with activity of the secretory mechanisms of temperature reduction. The cause of the thermal reaction presumably may be either (1) increased capillary circulation, (2) increased thermal permeability of the skin, or (3) increased metabolic activity.

(1) To demonstrate a possible circulatory factor, a moving-picture camera was combined with a microscope which could be focussed on an opening in the center of a finger electrode. Important physiological concomitants of visible change were recorded by a mirror galvanometer which projected a beam of light through a slit in the back of the camera, and by plethysmographic and blood-pressure indicators which threw shadows on the opposite edges of each moving-picture frame. With care to avoid the effects of local irritation of the skin it is photographically demonstrated that capillary dilatation frequently, although not

invariably, attends the galvanic reflex. This dilatation may occur even during a decrease in plethysmographically determined volume, in which case the decreased volume is probably a function of vasoconstriction in the arterioles or venules through excitation of the vasomotor center. The frequently observed capillary dilatation during the galvanic reaction is possibly due to metabolites released in the tissue by the physiological reactions to excitation.

(2) The apparatus described above also renders strikingly visible, eruptions of the sweat glands which are possible factors in increasing the thermal permeability of the skin.

(3) The thermopile, when maintained below body temperature, would be warmed by either the above mentioned increase in capillary circulation or in thermal permeability. When, however, the thermopile is held above body temperature by means of a circulating water system, these factors, if alone operative, should have a cooling effect. The fact that there is often an indication of increased temperature (or decreased absorption of heat by the body) under this latter condition would suggest local heat production, perhaps by resident metabolic activity.

J. F. Dashiell. *Some Changes in Psychomotor Efficiency in a Diabetic with Excess and Deficient Insulin Injections.*

A diabetic patient completely dependent upon insulin was tested at intervals through a normal day, and with these results were compared tests made during the condition (hyperglycemia) of underdosage of insulin, and during the condition (hypoglycemia) of overdosage of insulin (*i.e.* not balanced with food). Four tests were used: strength (on Smedley dynamometer); color naming; cumulative adding (orally adding 2, then 3, then 4, then 5, then 2, *etc.*); and serial discrimination (telegraph keys pressed according to numbers appearing in Ranschburg exposure apparatus, keys wired through Ranschburg and electric recording markers). During both abnormal physiological conditions deterioration was noted on all four functions, and especially during the condition following overdosage. It is noted that of the four functions measured, the color naming appeared the most sensitive to changes in general efficiency.

J. F. Dashiell. *Some Alleged Inadequacies in Reflexological Interpretation.*

The assumption that all behavior is properly to be interpreted in terms of reflex action, either as the elementary functional unit or as the type process, has been subjected to several challenges as to its adequacy to cover all the phenomena of behavior. The more conspicuous challenges are here examined. (1) A description in terms of reflexes may suffice for mechanisms but fails to take account of motivation, really overlooks the true organic character of the fundamental drives. (2) Such a description fails to take account of attentional and other long maintained aspects of behavior, overlooks the fact of tonic and postural reflexes. (3) Failures by operative technique to isolate specific neural centers or pathways for maze learning leave the alternative of vicarious functioning between reflex-like functions. (4) Experimental evidence against maze learning as an organization of reflexes is properly directed only against description in terms of chain reflexes exclusively. (5) Certain negative experimental findings in efforts to exhibit peripheral processes in thinking (as silent speech) may be offset by certain positive findings by others. (6) Configurational and organismic criticisms alike have overlooked the phenomena of interdependence among (even spinal) reflexes, as well as points urged above.

J. F. Dashiell. *An Experiment on Social Influences upon Individual Work.*

This study was made to verify the experimental findings of earlier investigators, and to extend the range of social influences so studied. With undergraduate students three types of functions were tested under four different social conditions. The tests included: multiplication (of 2-place by 2-place numbers), mixed relations or analogies (selected from Pintner and Renshaw's standardization), and free serial word-association. The social situations included: the individual working alone (A), the group working together in the same room but non-competitively (T), the group working together competitively (R), and the individual working under the observing gaze of spectators (O). (These four situations were taken in different orders of rotation with different sections of the whole classes used.) The findings include: no verification of the previously observed social facilitation of situation T over situation A (for which interpretation is offered); definite isolation of the rivalry factor, seen in R as *versus* T; definitely high acceleration of speed, but not of accuracy, under condition O. Need of close analysis of the factors in the different situations is indicated.

J. F. Dashiell. *Spatial Orientation in Maze-Learning as a Species of Animal* Gestaltung.

Rats were trained in an open-alley maze offering a great number of criss-crossing alternative and equal-length pathways from the entrance to the food-box exit. Each animal learned soon to adjust to the situation not by fixating some particular pathway but by running in the general direction of the exit now by one succession of turns and now by another, so that in a series of trials it followed a variety of different courses from entrance to exit. Each course was followed without error and each without any previous practice therein. Thus the animal's learning consisted in the establishing not of a definite *pattern of specific* turns but of some more *general orientation* function. This general function enabled it to pursue new pathways while remaining successfully oriented toward the objective, and, in the language of *Gestalt* psychology, to structure the situation in a manner that made the resultant configuration transposable in striking degree.

Exteroceptive sources of guidance (visual, auditory, and olfactory cues both from without and from within the maze) were checked by rotations, shuffling of construction units, air currents, *etc.,* leading to the conclusion that the performance must be controlled intraorganically.

What can be the precise nature of this general function? Classical theories of homing and additional suggestions are canvassed and discarded. An interpretation is offered for consideration in terms of initially established motor-sets and of compensatory tendencies. Support for some such explanation is furnished by further experiments in which the animal is introduced into the maze from different directions, and behaves consistently with these new directions of original set.

Orientation in direction throws light upon many incidents in maze learning; it is also offered as a fruitful principle to apply to certain cases of animal insight recently reported.

C. B. Davenport. *Inter-racial Tests of Mental Capacity.*

Attention is called to the importance of securing universal psychometric tests applicable to primitive peoples and thus independent of the use of vocalized language and special culture. Such tests are necessary for a study of the inheritance of mental traits in race crossing and, indeed, for the comparison of the mentality of races.

The difficulties in comparing the mental capacity of different races are not only in the nature of the tests used as a measurement of intelligence but also in securing some comparable social conditions so that the groups to be compared shall have not been unduly selected in different directions. It is suggested that here lies a better basis of race differentiation than the comparison of persons of different races living in precisely the same social sphere. An especial difficulty is met in the study of hybrids between a less and the more advanced race owing to the circumstance that the hybridization is between the higher members of the lower race and the lower members of the higher race.

F. Davis, see H. Carr.

Roland C. Davis. *The Effect of Varying Current on the Galvanic Reflex.*

Current was varied independent of the subject's resistance by putting the subject in the plate circuit of a vacuum tube. Electrode temperature was kept constant by means of a thermostat. Reflexes to a standard intensity of 60-d.v. sound of 0.4-second duration were measured by leading the voltage drop across the subject to the grid of an amplifier tube and recording them after three stages of d.c. amplification with an oscillograph.

Under these conditions the size of the deflection should tend to remain constant if the change is an evoked e.m.f. and the deflection divided by the current should be constant if the change is of ohmic resistance. Variability tends to be less when changes are computed as resistance, but is not reduced so much as the above supposition would require.

Indications are that when different intensities of current are used reflexes can be treated as neither resistance nor voltage changes. The conclusion can be explained on the basis of Höber's theory of electrotonus.

George Van Ness Dearborn. *Mental Deterioration.*

This paper is a report of active research and observation, mostly in a large Government hospital for the psychotic and for chronic cerebral and spinal diseases, over a period of the last several years.

The great importance of these results to psychiatry is pointed out, especially in the numerous borderline cases of psychosis in which it is difficult to decide whether or not to call the mental situation one of this class. Moreover, in determining incompetency the certainty of mental deterioration is of much practical moment in personal affairs.

It is held that regression is the only general criterion by which psychosis as such can be judged.

The most prominent features of mental deterioration and regression have been derived by analysis with the Stanford revision of the Binet-Simon scale in about four thousand closely comparable cases of psychosis, of psychoneurosis, and of normality. A new procedure has been developed for applying this instrument of relative precision to the determination and to the measurement of deterioration if it be present. The large variety of mental processes concerned in the application of this widely used intelligence-scale under the necessarily precise conditions employed makes available both this new analysis of deterioration and a new precision of measuring it.

W. F. Dearborn. *The Teaching of Reading from the Standpoint of the Non-Reader.*

What is practically an inability to learn to read under the prevailing methods of instruction in our schools is frequently characterized—as are some lesser degrees of difficulty in learning to read—by one of two similar but somewhat distinct conditions: (1) by reversals of the forms of certain letters and words, or of parts of words, in attempts at reading and writing, *i.e.* partially and occasionally completely mirrored reading and writing, *e.g* 'ton' for 'not,' 'god' for 'dog'; or (2) by alterations in the correct sequence or ordering of letters or of the outlines of word forms (and the substitution of incorrect elements) in reading and writing, *e.g.* reading 'framing' for 'farming,' 'scratching' for 'scarcely,' 'victoral' for 'victrola.'

The first condition is primarily associated with left-handedness and left-eyedness, and the second with deviations from the usual conditions of lateral dominance of hand and eye, as in ambidexterity, change of handedness and eyedness, and the combination of right-handedness with left-eyedness or of left-handedness and right-eyedness. In a large proportion of these latter cases, and in some of the former, a condition of muscular unbalance of the eyes (heterophoria) seems to be a complicating factor. These conditions make for variability and uncertainty in the perception of word forms, and in the memories (or images!) of the same letters and words, which in turn lead to confusion in their recall in reading and in their reproduction in writing.

In some of these cases it appears that if the pupil learns to write at the same time he learns to read, which is, of course, usually the case, the difficulty is aggravated. Current silent reading methods, as contrasted with the older oral reading methods, seem to have increased the incidence of these cases in this country. (It will be pertinent to inquire whether there is any evidence of such an increase in reading disabilities in countries where oral methods still predominate.) The present paper attempts to show the relation of the above indicated etiology of reading disability to the methods of instruction in reading and to suggest certain corollaries for the teaching of non-readers as well as of other children.

O. DECROLY. *Sur le dessin comme test psychologique.*

O. DECROLY. *Social Reactions of the Baby.*

Among the baby's reactions, those related to his first social reactions have a special interest. The research work, undertaken now on a very large scale, chiefly in the United States by a group of investigators with character tests,[1] gives a new impulse to the problem of how the first social reactions appear. Baldwin, in his book, *Mental Development in the Child and in the Race*,[2] has admitted that the first notions about fellow creatures confine themselves to those of objects having special properties, of which the child, little by little, becomes aware.

The first acquirements which the child makes and which permit him to distinguish persons from things, establish a considerable step in the genesis of social consciousness and social emotion.

However, ought we not to distinguish here between the knowledge of the fellow creature[3] and the instinctive impulse which leads the child to seek for affection, and chiefly to be demonstrative towards another child, without the possibility of thinking that there is some interference of recollections of pleasant sensations, like those awakened by the sight of the mother, of the nurse, or of the person who usually takes care of him?

The facts reported by Bühler, Hetzer, Gesell, and others have shown with more details which are the stages the child goes through during his first year. The differences they have noticed between the evolution of the child's reactions towards adults and towards another child, rather confirm the point of view defended by Baldwin and me, according to which the child's attitude probably has nothing specifically social at this stage.

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[1] Cf. M. A. May, H. Hartshorne and R. E. Welty, Personality and character tests, *Psychol. Bull.*, 24, 1927, 418–435.

[2] Cf. J. M. Baldwin, *Mental Development in the Child and in the Race*, 1895, French trans., 1897.

[3] Cf. Decroly, La notion anthropognostique, *Arch. de l'Inst. de Sociol. Solvay*, 1908.

Bühler's and Hetzer's experiments with a cat and a little motor car are insufficient, though they seem to allow these reactions to special emotional stimulants. Nevertheless the rôle of development of intelligence in these reactions appears rather to show that the social reaction is partly the result of experiments previously acquired. In order to resolve these problems it would be important to undertake researches about abnormal children's reactions and to compare the observations with those about normal children at different stages of development.

We started investigations of that kind with the aid of the cinema, synchronously with some other investigators, twenty years ago, in order to gather information that would make easier the study of the same reactions by different persons, and would subsidiarily affords means for demonstrations to students or professional men's audiences.

The plan of researches and of the information to be collected is as follows:

(1) Reactions of the 0- to 1-year baby towards various adults, intimate or unknown.

(2) The same towards familiar adults whose outlook is changed, motionless, speaking, smiling, angry, *etc.*

(3) The same towards other children, younger and older, in various attitudes.

(4) The same towards different dolls offering automatic motions, or being motionless.

(5) The same towards himself in different attitudes with and without mirrors of various sizes.

(6) The same towards different living animals, insects, fishes, birds, hens, dogs, cats, rabbits, sheep, goats, cows, horses.

(7) The same towards dead animals and stuffed ones fastened on a string which can make them move.

(8) The same towards motionless things or things mechanically moved.

(9) Reactions of the different classes of abnormal children, chiefly those of the insane and the idiot in comparison with those of the blind, the deaf or the motor defective.

O. Decroly. *Évolution des aptitudes graphiques.*

L'importance considérable de l'aptitude graphique et sa corrélation élevée avec le degré d'intelligence nous a suggéré depuis de plus de vingt ans des recherches dont nous avons publié les premiers résultats en 1912 (*Journal de neurologie*) ; une seconde recherche fut faite sur nos indications par Mlle. Decorde, et les résultats publiés à la II^e^ conférence de Psychotechnic de Barcelone (1921).

Au séminaire de l'Institut supérieur de Pedagogie Buls-Oempels à Bruxelles nous avons remis la question à l'étude et avons notamment fait faire diverses épreuves au nombre de six: (1) un garçon court avec un chien, (2) un garçon va en vélo, (3) quatre enfants sont assis autour d'une table carrée et mangent, (4) un ballon passe au dessus de la tête, (5) une rue vue en perspective, (6) un garçon vu du balcon et placé sous celui-ci. Parallèlement nous avons fait écrire une phrase en vue de nous rendre compte de la corrélation de l'écriture et du dessin.

Nous avons soumis à l'étude statistique le sixième dessin, qui nous avait paru dans nos essais antérieurs offrir le plus de variétés suivant l'âge. C'est celui qui répond à l'instruction suivante: vous êtes à votre fenêtre à l'étage ou à votre balcon; sous la fenêtre se trouve un enfant. Dessinez comment vous le voyez.

Les degrés suivants ont été remarqués.

(1) Chez les jeunes enfants (moins de 6 ans) le dessin ne répond qu'à une partie de la question; on voit un enfant seul, ou une fenêtre, ou un enfant à la fenêtre (l'enfant est dessiné de face).

(2) Dans une seconde étape l'enfant se dessine à la fenêtre, ainsi que le personnage sur le trottoir (entre 6 et 8 ans).

(3) Il cesse de se dessiner et représente seulement le personnage du trottoir, généralement de profil (vers 8 à 9 ans).

(4) Il ne dessine plus que la partie supérieure du corps, ou la tête, ou le chapeau, mais sur un plan vertical, c'est à dire comme partie du cliché antérieur (vers 10 à 12 ans).

(5) Il dessine d'une manière plus ou moins exacte et complète la projection de la tête, des épaules, des bras et des pieds (vers 12 à 14 ans).

Le dernier stade n'est atteint que par un très petit nombre d'adultes.

Il semble que l'épreuve puisse servir si non comme épreuve additionnelle d'intelligence, du moins comme épreuve d'aptitude. Cette épreuve peut être variée de plusieurs façons, par exemple en faisant dessiner un cheval attelé ou un robinet vus de face, une cafetière vue d'au dessus, un personnage vu de dessous à travers une dalle transparente, ou du haut d'une échelle qu'on tient en main, ou couché sur une table et qu'on regarde du coté des pieds, les yeux étant au niveau de ceux-ci, *etc.* D'autres épreuves du même genre ont déjà été expérimentées, notamment le ballon sphérique ou le dirigeable vu d'au dessous, la rue vue en aéroplane. Elles ont donné des résultats comparables.

FORREST LEE DIMMICK. *Auditory Apparatus.*

The Hobart College Laboratory has two forms of beat-frequency oscillator which have proved to be valuable instruments for demonstrations and research in the field of audition. Two vacuum-tube oscillator circuits, one fixed and one variable, are coupled in such a way that they give a voltage wave, variable over wide ranges of rate and amplitude, that produces a relatively pure tone in a loud-speaker or a telephone-receiver head-set.

For use in conjunction with the loud-speaker we have devised a switch which starts and stops the tone without giving a click.

Another device is in course of development for the production of various wave forms by an adaptation of the siren principle to induction.

RAYMOND DODGE. *Fundamental Steps in the Development of Adaptive Behavior of the Eyes.*

Records of the human eye-movements following a simple object of regard in harmonic oscillation show characteristics which lead us to the following generalizations.

I. Approximation and correction is a type of adjustment that appears in simple forms of human behavior as well as in the development of science. We conjecture that it ranks close to

trial and selection as a formula of behavior. While the beginning of an organism's response to a new situation commonly follows the principle of trial and selection, subsequent fine adjustment within any mode of response is commonly made according to the formula of approximation and correction. The latter seems to be a complement of the former.

II. The tendency of an adjustment pattern to break down at or near its physiological limit and to give place to a simpler type of adjustment appears in response to relatively simple stimuli, as well as in response to the complex stimuli of our social and economic environment. We conjecture that it represents some fundamental but unknown characteristic of neural integration that must be reckoned with at all stages of human and infrahuman development.

III. Anticipatory reaction is found in a simple form of human adaptive behavior as well as in that which depends on insight or purpose. We conjecture that it is one of the fundamental forms of learning to meet situations. Whether it develops on the basis of cues which are systematically related to adequate stimuli or on the basis of the integration of particular stimuli into more inclusive units seems to be an open question.

RAYMOND DODGE and JAMES C. FOX, JR. *Photographic Records of Normal and Abnormal Optic Nystagmus.*

Photographic records of the eye-movements have been obtained under various conditions of health and disease of the nervous system by means of a nystagmograph. This employs the principle of photographing the horizontal deviation of the conjugately moving closed eye by means of a mirror recorder which is pressed against the closed lid of one eye tangential to the underlying corneal surface and reflects a beam of light to moving photographic paper. The variants originating in the technic, such as head and lid movements, can be readily identified and discounted and offer no serious obstacle to satisfactory interpretation of the nystagmograms.

Optic nystagmus may be defined as the conjugate response of the eyes to a succession of moving visual stimuli, consisting in a slow phase or pursuit of a moving object and a quick phase or refixation of a new oncoming object. Gradual acceleration of the angular velocity of the moving visual field evokes evidences of gross inadequacy of pursuit in the average subject above 90° per second.

Eight pathologic cases have been chosen for the presentation of certain nystagmographic disorders and their correlation with the underlying physiologic disorder of the nervous system in each case.

In the competition for the common pathway resulting from the conflict between a spontaneous pathologic nystagmus and a superimposed optic nystagmus, the optic impulses directed to the higher centers seem to have the lesser influence in directing eye movement.

EDGAR A. DOLL. *Opportunities for Research in Public Institutions.*

Public institutions for the blind, the deaf, the delinquent, the insane, the feeble-minded, and for normal children and adults offer exceptional opportunities for research. The conditions of experimentation are especially favorable in that they provide unusual conditions of selection of subjects and control of variables. Research on institutional subjects is not only of major concern to such special fields of psychology as abnormal psychology, educational psychology, clinical psychology, and the like, but the results of such investigations have been found to throw important light upon many vital problems in the field of general and normal psychology. Many of the theoretical problems in psychology can feasibly be approached from the study of abnormal deviations. The individuals presenting these deviations are readily available in public institutions under controlled conditions. Illustrations of successful institutional research are cited and various types of problems of both technical and theoretical interest which can be studied under institutional conditions are suggested.

Edgar A. Doll. *Relation of Intelligence to Criminality.*

The thesis that defective and subnormal intelligences are predominating characteristics of delinquents and criminals and therefore important underlying factors of their criminality may be examined in the light of recent experimental evidence. Attention is called to the importance of certain variables which influence the selection of delinquents and criminals who have been the subjects of experimental investigations, and which have suggested the importance of intelligence as a factor in criminality. The intelligence of delinquents and criminals has been compared with the standard intelligence of the social and racial groups from which they are predominantly drawn rather than with the standard intelligence of the general population; and the intelligence levels of juvenile delinquents, youthful offenders, and adult criminals have been compared with each other and with examples of the general population, according to various criteria and methods of selection. The general conclusion is that intelligence plays an important rôle in criminality, but not so important a rôle as is commonly accredited to it. The further conclusion may be drawn that the importance of mental deficiency as a cause of criminality is less among adult criminals than among youthful offenders, and less among youthful offenders than among juvenile delinquents.

June E. Downey. *A Suggestion for Study of Character-Creation.*

That intuitive and artistic reconstructions of personality may have great practical value, particularly in the field of clinical diagnosis, is generally admitted, but the difficulty inherent in handling imaginative syntheses in an experimental way has blocked scientific progress in treating personality as a dramatic whole. It may indeed be maintained that the dramatic conception of personality is an aesthetic rather than a practical one. It has frequently been pointed out that the supreme personalities of history are in a sense fictional products. Thus Havelock Ellis dilates upon the Platonic Socrates, and " the glory of the artist who made him what he has become for us." If one could catch the creative impulse at work, watch a personality in the making, valuable hints for scientific procedures might be obtained.

This report suggests the possibility of studying the creation of personalities for press and publicity purposes by way of the newspapers of a period, and the pictorial and verbal cartoons of the day, in the hope of discovering thereby the motivation that underlies the selection of phases of character to be played up and of dominant and unifying qualities which confer distinctiveness upon a personality. It might also determine the degree to which the creative imagination can create character out of whole cloth and drape it upon a lay figure. Ornamental characters need, apparently, contribute little more than a good physical presence and well-chosen clothes. But more than this would seem demanded for creation of spot-light personalities. Sometimes, indeed, publicity agents find themselves thwarted by the material at their disposal. The expression 'clowning well' is said to be used by newspaper men to refer to those personalities that lend themselves easily to publicity purposes. The form-quality of some individuals is obviously much more easily perceivable than that of others. Moreover, the individual upon whom a personality pattern is impressed by his public must meet it half way. Public personalities must grow into the characters designed for them and break character only in situations suggesting humorous reversals. Self-dramatization obviously plays an important part in the imaginative assumption of a personality and should be studied in this connection, especially the degree to which it may be carried without involving personality disintegration in the effort to dissociate traits which do not belong in the picture.

JUNE E. DOWNEY. *Psychological Doctrine and Teaching Experience.*

As a teacher-psychologist, I find there have been for me three main trends of interest in the psychological side of my profession. First, an interest in minute individual differences analyzable only by laboratory methods and obscured by statistical procedures; second, an interest in psychometry with all its various ramifications from intelligence testing to personality rating; third, an interest in human motivation and in the conflicts that are the subject matter of mental hygiene.

My interest in these trends has issued in the following generalized conclusions. First, that variational psychology is not only an important branch of general psychology, but has great contributions to make to effective teaching when methods adumbrated by recent work on special disabilities shall be extended to the study of special abilities. Second, that the social implications of striking mentality differences have not yet been thoroughly realized, and that, in particular, the problem of the relative intelligence of pupil and teacher has escaped consideration. Third, that human motivation strongly demands more scientific attention, since it is at this point that the failures of educators are most pronounced. Thus far, success in motivating pupil activity has been largely dependent upon the teacher working as an artist rather than as a scientist.

JUNE E. DOWNEY. *Slant in Handwriting and Sinistral Tendencies.*

A tabulation of the slant of 690 specimens of handwriting indicates that from 3.6 per cent to 4.6 per cent of *dextral* penmen write a back-slanted hand. If writing were speeded this percentage would be somewhat increased. In contrast, 123 subjects in a two-minute speeded test with the *left* hand gave nearly 75 per cent of back-slant; 484 dextral penmen inscribing name and address with the left hand, under name and address written with the right, gave 32.4 per cent of back-slant. In the latter case imitation operates to reduce the percentage.

Among 141 *sinistral* subjects, writing with the *left* hand, 31.2 per cent were back-slant. There is a slight difference in this group between 'shiftovers' and 'non-shiftovers'; the former rate 38.8 per cent back-slant, and the latter 22.4 per cent. This difference may be due to the fact that for the 'shiftover' left-hand writing has not been molded by conventional training. Sinistral subjects with the *right* hand give 15.8 per cent reversed slant, with practically no difference between practiced and unpracticed hand.

These results are in accordance with the assumption of a centrifugal preference in movement. When the direction of writing and its slant are so determined they are in harmony. Under other conditions, as in dextrad writing with the left hand, they are in opposition and so tend to produce a reversed slant unless training operates to check the tendency. Back-slanted writing is usually an indication of a sinistral drift of some sort. Observations on some 45 supposedly dextral individuals who write a reversed hand revealed that from 4 to 7 of the group were ' shift-overs ' and others ambidextral.

Ocular dominance also plays a part in determining a back-slanted script; fully 60 per cent of the above group were left-eyed or had impartial vision. In experimental left-hand writing, back-slant is much more frequent in the case of left than of right ocular dominance. In part, such slant insures better visual control.

In mirror-writing, conditions are reversed. Here a forward slant is indicative of sinistral tendencies. Back-slant or slant to the right is common for dextral penmen. Among 61 samples of experimental mirror-script, forward slant appeared in only 7 cases of right-hand and 14 cases of left-hand writing. A number of the penmen writing a forward slant were found to be naturally left-handed. Spontaneous mirror-script written by natively left-handed individuals should be forward-slanted. The published samples of this sort available seem to substantiate this assumption—an interesting confirmation of the observation that slant is indicative to a certain degree of sinistral or dextral preference.

JAMES DREVER. *Meaning as Affective.*

Elsewhere the present writer defended the thesis that from a psychological point of view *meaning* must be regarded as primarily affective, if any valid or even reasonable account is to be given of the psychology of *meaning* at all. The essential psychological phenomena of *meaning* are not to be discovered by an analysis of the meaning of words. That leads inevitably to a logical rather than a psychological investigation. Nor is it possible to lay bare these essential phenomena by attempting a psychological analysis of our mental processes when we *mean* or intend something. Psychologically this is a secondary and not primary sense of the word. The analysis we must rather undertake is of the *meaning* that something has for us—some object, situation, memory or idea. The *meaning* essentially resides in the relation of the something to us, and it is that to which we respond or react. Here, as in so many other cases, our psychology has gone astray through our failing to take cognizance of the concrete whole of an experience—the stimulus-response totality in the raw, if we may put it in that way.

The *meaning* is obviously not the object in pure cognition. When I perceive a cow, the cow is not the *meaning*. Nor is the *meaning* in my motor response. If I run away from the cow the *meaning* is not in the running away, nor even in the underlying conation. My fundamental position is that the *meaning* involved in any experience as a totality is its affective aspect in the first instance, and that any subsequent *meaning* is essentially, and in the last resort, a derivative of this.

We recognize in our analytical psychology that there is an affective aspect of experience, but we make surprisingly little use of it in our systematic psychology. That is why the psychology of *meaning* has seemed to present such formidable difficulties. Our systematic psychology is almost wholly a psychology of the cognitive. In the raw concrete cognitive of our experience there is no room for raw *meaning*.

In *The Locomotive God* by William E. Leonard is related the following: " When I was alone in the house, aged six, with my sister one morning, a whimsical cow stuck its head into the window of the downstairs back bedroom and lowed at me. She might of course have startled any child *qua* cow. I knew cows; I had seen this very cow tethered in the field between our house and the next. She did not startle me *qua* cow. But the feel of uproar and menace was overwhelming. The cow-idea disappeared in the idea of imminent death. I was too paralyzed to scamper away. I pulled my sister—as much bewildered by my antics as by those of the cow—to her knees beside me. I prayed God. I made her pray. The cow looked on and lowed again. I fled with her to the attic, to a closet in the attic. I prayed again. I heard footsteps rumbling and creaking on the floor below. The cow coming up the stairs!"

Elsewhere in the same book we get numerous illustrations of similar phenomena. The book is in fact one of the most valuable records of affective phenomena ever written, and from our present point of view they are often illuminating. The *meaning* in the cow-experience is obviously not the cow-idea as cognitive, but clearly the *feeling* of menace, that is to say the relation to the instinctive disposition of flight or escape—or rather it might be better to say the relation to the organism implied in the activity of this disposition. On the physiological side, this would doubtless be represented by processes in the glands and the smooth musculature stimulated through thalamic centers and the autonomic system. On the psychological side, it is affect or feeling.

It must be noted, however, that while this holds of the *raw* experience, the experience for subsequent reflective thought becomes, so to speak, conceptualized, and the primary *meaning* appears in its secondary form as cognitive and conceptual, as 'significance,' if we may specialize that term to designate this conceptualized phase.

KNIGHT DUNLAP. *Repetition in the Breaking of Habits.*

Adhering to the *beta*-hypothesis as to the effects of repetition, further data are presented with regard to the efficacy of repetition in the disintegration of habits, particularly such habits as are deemed undesirable or deleterious (stammering, fingernail biting, sexual vices, *etc.*), and the causes of apparent failures of the method indicated. The necessity of the development of special techniques for different types of habits and different ages is emphasized, and theoretical implications are pointed out.

U. Ebbecke. *Ueber den peripheren und zentralen Anteil der Nachbilder.*

Es gibt eine Art von Nachbildern, die als Sinnengedächtnis, psychische Nachbilder oder Anschauungsbilder beschrieben und durch ihre Eigenschaften (Aufmerksamkeitseinfluss, Wandelbarkeit, Beweglichkeit, Zusammengesetztheit, Dauer) als zentral und kortikal gekennzeichnet sind. Die gewöhnlichen Nachbilder, durch kurz dauernde Exposition eines lichtstarken Objekts oder durch langdauerndes Fixieren eines weniger lichtstarken Objekts erzeugt, gelten als peripher und retinal. Aber auch bei ihnen sind mehrere hintereinandergeschaltete Neuronenstationen beteiligt. Die erste retinale Station zeigt keine andere Nachwirkung als eine mit der Zeit abklingende Nacherregung von verschiedener Stärke. An diese retinale Nacherregung, die an sich immer nur ein positives Nachbild liefern könnte, erfolgt eine zentrale Anpassung (Lokaladaptation) nach dem Schema der reziproken antagonistischen Innervation, die bei gleichbleibender Verdunkelung das positive Nachbild zum Verschwinden bringt, bei eintretender Belichtung als negatives Nachbild zu Bewusstsein kommt, aber auch sich bald verliert. Daher pflegt ein Nachbild immer nur kurze Zeit, einige Minuten, sichtbar zu sein, während die retinale Nacherregung sich stundenlang halten kann, unbewusst bleibt und nur durch die Methode des Belichtungswechsels intermittierend bewusst gemacht und nachgewiesen werden kann. Der aus der experimentellen Analyse der Nachbilder gefolgerte Innervationsvorgang ist ein Beispiel für eine allgemeine Einrichtung, welche eine einseitige Inanspruchnahme durch Dauerreize verhindert und für einen Ausgleich der Erregungen und wechselnde Aufnahmebereitschaft sorgt.

U. Ebbecke. *Der psychogalvanische Reflex in der Narkose.*

Der psychogalvanische Reflex (galvanische Hautreflex, g. R.) lässt sich mit einfachen Hilfsmitteln (Akkumulator, Handgriffelektroden, empfindliches Zeigergalvanometer $1^0 = 10^{-6}$ A) bei Gelegenheit chirurgischer Operationen am Menschen untersuchen und zeigt, ausser den Affektschwankungen in den der Narkose vorausgehenden und nachfolgenden Stadien, auch während der Narkose die durch operative Eingriffe und pathische Reize hervorgerufenen Schwankungen in der Schweissdrüseninnervation an. Wenn nicht bei der Narkose durch Atropin und Morphium die Sekretion beeinträchtigt ist, so finden sich auch in den tiefsten Graden der narkotischen Bewusstlösigkeit noch Reste des g. R., sofern nur die Reize stark genug sind. Am stärksten wirken Eingeweidereize, die mit Zerrung des Peritoneums einhergehen. Für gewöhnliche Schmerzreize von der Haut aus verschwindet der Reflex in der Narkose, und zwar bei Vertiefung der Narkose etwas später als der Kornealreflex. Die Befunde entsprechen den an Schlafenden angestellten Untersuchungen (Peiper) und zeigen, dass ein bewusster Affekt nicht zur Auslösung der Affektsymptome erforderlich ist.

Gleichzeitig mit den rasch zurückgehenden Schwankungen des g. R. wurde fortlaufend der Hautwiderstand registriert, der im Lauf der Narkose typische Aenderungen durchmacht. Eine Narkose ohne operative Eingriffe zeigt ein langsames andauerndes Anwachsen des Hautwiderstandes, dem beim Erwecken ein plötzlicher steiler Abfall folgt. Aehnlich verhält sich der postnarkotische Schlaf. Operative Eingriffe in tiefer Narkose können, ohne zu erwecken, den Widerstand stark und langdauernd herabsetzen. Es reagieren also bei Ausschaltung der Oberzentren die vegetativen Zentren des Hirnstamms und verlängerten Marks. (Partielles, dissoziiertes Schlafen und Wachen der einzelnen Hirnbezirke).

HELGA ENG. *Is the Plethysmographic Method Sufficiently Utilized for the Study of Emotion?*

The expressiveness of the plethysmographic curve is known to me from experience, and I have wondered why it is not made more use of to explore the still rather obscure field of the psychology of emotion. As author of probably the most recent plethysmographic study of emotion[1] I shall try to give a brief

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[1] *Experimental Investigations into the Emotional Life of the Child Compared with that of the Adult.*

account of my results, and to point out what I think might be expected of further experiments.

The sources of error are numerous; nevertheless, my experiments gave surprisingly clear and definite results, probably owing to various improvements in apparatus and method, the most significant of which I found out during several weeks of trial experiments, namely that the plethysmograph ought to be fixed, immovable, not suspended as by Lehmann. The subjects were 11 children and 14 adults. Children proved to be very good subjects. There were 510 successful experiments measured and tabulated.

The most significant results are the following: Spontaneous displeasure emotions are very rare in children, more frequent and of longer duration in adults. Spontaneous emotions of children are for the most part connected with sensory impressions, those of adults with more personal psychical experiences. This indicates a development of feelings and emotions from child to adult.

The pleasure-displeasure theory is not corroborated. My experiments show pleasure, displeasure, excitement, depression, attention emotion, activity emotion. Mental displeasure differs from sensory displeasure, pleasure through music from pleasure through tastes and odors. Fright and bodily pain has each its peculiar signs. My findings suggest that basic emotions may be more numerous and differentiated than we have imagined.

With regard to the theory of James-Lange my observations teach me that emotions are primary and the vasomotor and respiratory changes secondary. Mosso declared that mind is the slave of matter. I come to the conclusion that mind rules matter.

As problems for further investigation one might suggest the following: Basic types of emotion; complexity of emotions; spontaneous emotions, development of feelings and emotions, child and adult; emotional types.

My experiences show that valid results may be expected of experiments and self-observation, controlled by the plethysmograph.

Horace B. English. *The Reliability of a Test.*

The concept of the reliability of a test was introduced by Spearman in 1904 in a footnote: "The correlation between two series of observations will be found a useful measure of the accuracy of the observations." The practical utility of such a measure led to its widespread adoption without adequate consideration of what was being measured. There resulted a discrepancy between what, mathematically and logically considered, is being measured, and the deductions therefrom.

Careful study of the latter indicates that what is needed is a measure of the intrinsic stability of the test or other similar instrument. It is therefore proposed to define reliability as *the extent to which a measure is unaffected by chance factors intrinsic to the measuring instrument itself.*

Correlation between two applications of the 'same' test (Brown) or between two applications of 'comparable' tests (Spearman) yields indeed an estimate of such reliability but it is contaminated by a number of influences which are irrelevant to this issue. It is impossible to determine the comparability of two tests save in terms of the very correlation it is used to qualify. Nor can one safely ignore practice and indeterminate changes in the reactor (both variable with the interval) or the influence of external conditions and of the behavior of the examiner. This correlation is in short a measure of the reliability or consistency of two testings at two particular times under certain particular conditions. It is hopelessly ambiguous as a measure of the reliability, not of the particular testings, but of the test itself. It might well be called an *index of re-test consistency.*

A less equivocal index of test reliability is, however, available whenever the test consists of a series of formally homogeneous items. This is the familiar device of correlating random halves. This has often been used when the correlation of comparable tests was impracticable, but either without distinguishing it as distinct, or apologetically as an inferior method. Empirical studies confirm the differences to be expected from the above reasoning. And so far from being inferior, the method of random halves is in all cases to be preferred because of its greater freedom from the influence of unquantified influences; it is statistically less ambiguous.

Carl I. Erickson. *An Attempt to Determine What Types of Criminals May Be Safely Paroled.*

The paroled criminals from a Western Penitentiary are classified after the period of parole as violators or non-violators and then compared for the purpose of discovering differences of practical value to the parole board. The bases of comparison consist of relative frequency of different types of crime committed, institutional records, biographical data, and the results of tests—tests of intelligence, Downey Will-Temperament test, Laird's Personal Inventory C2. Since the study began only eighteen months ago, adequate records are now available for only 210 violators and 120 non-violators.

The data at hand show that approximately 90 per cent of the violators commit crimes that can be classified in one of four groups, viz., burglary, robbery, grand larceny and forgery, whereas only 45 per cent of the non-violators commit crimes that can be classified in any of the four groups mentioned. Burglars constitute 24 per cent of the group of violators and less than 3 per cent of the group of non-violators. The percentage of robbers in the violator class is clearly larger than that in the non-violator class. In cases of grand larceny, the non-violator, in contrast to the violator, is more often found to be twenty-five years of age or younger; he will average a little higher in intelligence; he will have fewer conduct demerits; he is less inclined to commit crimes alone; he has less often been in a penitentiary before. The violators cannot be clearly distinguished from the non-violators on the basis of intelligence nor on the basis of the other test records.

ALVIN C. EURICH. *An Experimental Study of the Reading Abilities of College Students.*

The investigation reported herein is an attempt to determine the extent to which college freshmen can improve their reading abilities under a rigid program of intensive drills in paragraph reading and vocabulary.

Experimental and control groups of 100 each were used in the first experiment. The members of these groups were paired on the basis of intelligence and sex. At the outset ten initial measures were made upon both groups which included tests of the following types: (1) reading comprehension, (2) retention in reading, (3) speed of reading, (4) general vocabulary, (5) intelligence, and several English composition and literature tests. These tests had previously been evaluated and standardized. Throughout a period of three months the experimental group devoted seventeen minutes of each class period in English composition to drills in paragraph reading and vocabulary. In addition it was given numerous 'how-to-study' exercises to be completed outside of the regular class periods. On the other hand, the control group spent all of this time in the study of English composition. At the close of the three months period both groups were given a series of final tests which in most instances were duplicate forms of the initial tests or repetitions of them.

The second experiment differed from the first to the extent that the training period was limited to drills in vocabulary.

In Experiment I, the only significant gain which the experimental group made over the control group was in two vocabulary tests. In the first of these, each word had been selected from the vocabulary exercises that were used with the training group. In the second test there was partial overlapping with the training exercises. In a general vocabulary test in which there was no overlapping of the words with the training exercises, the experimental group showed no significant gain over the control group. No significant gains were found on the reading tests, composition tests and final grades. It is of considerable interest to note that, if the data are treated in regard to the gain which the experimental group made on the final test over the initial test, consistent and significant gains can be reported. When these are contrasted with the gains made by the control group, they can no longer be attributed to the efficacy of the training exercises.

On the whole, the results from the second experiment corroborate those of the first. Thirteen out of fourteen differences, however, favor the experimental group. In spite of the fact that "certainty" can be ascribed to only one of these differences, the occurrence by chance of this proportion in one direction is only 1 in 1170. Since the accumulation of small differences is exceedingly difficult of interpretation, the only conclusion that can definitely be drawn is that significant gains appear as a result of the training period in those functions in which specific drills were given and when those gains are measured by the drill material itself.

PAUL FARNSWORTH. *Sex Differences and Item Difficulties in Music Tests.*

It has long been known that there are no large sex-differences to be found in the Seashore battery. It is interesting to note, however, that the slight differences recently reported by Peterson and Lanier for white college students also appeared in the data which the present writer has been collecting for several years; that is to say, the girls scored slightly higher in 'pitch,' 'tonal memory' and 'consonance,' while the boys made higher scores in 'intensity,' 'time' and 'rhythm.' Ten musicians who were acquainted with the tests were asked to guess on the question of sex-differences, and all but one ranked the differences in the order found. Various 'environmental' theories were advanced

Item difficulties have been tabulated on the pitch, intensity, and time tests for two university groups of 100 each. The group intercorrelations are extremely high.

FRANKLIN FEARING. *The Variability of the Tendon-Reflex in the Intact Organism.*

It is the purpose of the paper to discuss the variability of the reflex response of the intact organism in the light of the traditional conception of the reflex arc. If we assume that the psychological process of attention is associated with the functioning of neural arcs involving the higher centers, the problem of variability may be defined for experimental purposes as follows: What is the differential effect on the reflex act of a sharply focussed and controlled attentional state such as is associated with a specifically defined task, as distinct from a diffused 'uncontrolled' attentional state?

Two preliminary investigations furnish data pertinent to this problem. In the first the effect of controlled and uncontrolled attention upon the postural reflexes was studied. By the use of the Miles ataxiameter it was possible to study the effect of a discontinuous auditory distraction upon the maintenance of balance in the standing position. It was found that attentional control reduced the amount of sway in statistically significant amounts.

In a second investigation the effect on the knee-jerk of a voluntary act occurring just before, during, and just after the kick, was studied. Approximately 1,700 measurements of the knee-jerk time and amplitude were obtained. It was found that the knee-jerk is significantly modified both as to time and intensity by the accompanying cognitive reaction. When the knee is stimulated before or at the moment of the voluntary reaction, the latency of the jerk is lengthened and its intensity is reduced; when the knee is stimulated after the voluntary action, the jerk is augmented and its latency is reduced.

The results of these two investigations point to the broad generalization that *in the intact organism the so-called reflex arcs rarely, if ever, function in isolation.* The variability observed in the latency and intensity of the reflex is in part accounted for by this functional relationship with coincident or nearly coincident processes occurring at other levels of the nervous system. It is suggested that these coincident cortical processes are at the base of the psychological phenomena of attention. If this is true, all experimental work on reflexes in the intact organism must take into account the attentional state of the subject.

That the organism functions as an integrated unit, that in the normal individual there are no isolated neuro-muscular segments—these are truisms which all of us are doubtless inclined to accept. Yet it not infrequently appears that in experimentation and theoretical discussion, a functional independence is tacitly ascribed to the reflex which, in reality, it does not possess.

The isolated reflex ' act ' is an abstraction. Except in experimental animals whose neural segments are artificially isolated by operative procedures, it does not exist in its ' pure ' form. It is a favorite fiction, however, of the text-book writer because of its simplicity and the ease with which it may be diagrammed. The suggestion is ventured that the time has arrived to discard it along with those other interesting and convenient abstractions in psychology—namely, sensations and instincts.

FRANKLIN FEARING. *Physiological Psychology of the Seventeenth and Eighteenth Centuries with Especial Reference to the Theory of Involuntary Action.*

The attempt is made to summarize from the original sources the important contributions of the second half of the seventeenth and the first half of the eighteenth century in the field of physiological psychology. This period is of peculiar significance to modern psychology because of the fundamental contributions to the psychophysiology of nervous integration and control of movement. The modern conceptions of automatisms, involuntary movements, reflex actions, and integrated action of the nervous system may be traced to theories and experimental contributions of Swammerdam, Descartes, Willis and others.

Among the important contributions of this period are the following:

(1) The demonstration that the cerebral hemispheres are not essential to animal movement.

(2) The specific description of many important bodily automatisms, *i.e.* integrated movements which were carried on independently of the brain or conscious control.

(3) The statement of the theory of reflex action.

(4) The demonstration of the important rôle of the spinal cord and cerebellum in bodily movements.

(5) The demonstration of the inadequacy of the hypothesis of 'animal spirits.'

(6) The rejection of the hypotheses which explained animal movements in terms of non-material agencies of control or mysterious vital 'principles.'

F. S. FEARING, see also C. S. STOLTENBERG.

NORMAN FENTON. *The Approach of Clinical Psychology in the Readjustment of Juvenile Delinquents in State Correctional Institutions.*

In the institutional care of delinquent children it is highly desirable that all who have contact with the child be familiar with his needs and be working together on a carefully defined program for each individual. At the Whittier State School in California a weekly clinic is held, at which time the cases of all boys who have been in the Receiving Cottage for about two months are considered. All available information, psychological, educational, social, and medical is presented in a brief and yet clear manner. The clinic is attended by everyone in the institution who is significant in the life of the child there. This includes the superintendent, the psychologist, the cottage supervisor, the director of vocations, the chief supervisor, the chaplain, the school principal, the placement officer, the physician if the case presents medical problems, and others whose interest in the boy and whose intelligent understanding of the boy's difficulties are essential in his successful readjustment. The inauguration of this procedure has been of tremendous significance in increasing the effectiveness of the entire program of the institution.

SAMUEL W. FERNBERGER. *The Use of Equality Judgments in Psychophysical Procedures.*

The inclusion of equality judgments has been a problem in the use of the psychophysical methods from the beginning of the use of these procedures. Various attempts have been made to eliminate them—by prohibiting their use by instructions, by allowing them in the report but statistically dividing them between the other categories of judgment, and by statistically redefining the thresholds. This problem has again claimed attention with the statistical work and point of view toward the psychophysical methods of Thurstone.

Historically the use of the equality judgment is important inasmuch as the earlier form of the method of just perceptible differences utilized this concept as a starting point in two of the four experimental procedures. In the later developments of the psychophysical measurement methods, the equality judgments remain of paramount importance. In Urban's development of the method of constant stimuli, the so-called interval of uncertainty (the interval between the thresholds which has been recognized as the measure of sensitivity of the subject) is determined by the number of equality judgments. In the curves of the psychometric functions this is true, statistically, because the five-sided figure bounded by the threshold ordinates, the abscissa between them, and the curves of the two extreme judgments between the threshold ordinates and their point of intersection has an area equal to that bounded by the curve of the equality judgments and the abscissa.

In practice, the handling of the equality judgments has been difficult inasmuch as they depend, in part at least, on the attitude of the subject, and the number of equality judgments given may depend on the form of the instructions to the subject and on the subject's interpretation of these instructions. Here, as elsewhere, it is difficult to handle situations which are subjective in their nature, especially without the frequent introspective report of the observer. Such a report would limit the use of the psychophysical measurement methods to the normal adult subject who is furthermore trained in systematic introspection. Indeed there has been at least one case in the literature where the subject, in an extended series of judgments, failed to give a single equality judgment under the usual instructions. In this case, the upper and lower thresholds coincided and the interval of uncertainty was zero. This implies that this subject could judge a difference between two stimuli with a probability of at least 0.5 even though this difference was infinitely small.

But even though the equality judgments prove to be difficult to handle, they nevertheless actually do occur with greater or less frequency. On this point we have ample introspective evidence. The elimination of such judgments would, therefore, give an erroneous picture of consciousness as we find it. It is evident that we need a program for the further experimental determination of the influences affecting such judgments which would lead to a standardized set of conditions and instructions for their more adequate control.

ADELBERT FORD. *The Group Experiment as a Teaching Device.*

The deficiency of psychology in the use of laboratory experiments admittedly of high pedagogical value, can be partially remedied by the use of the group experiment in which as many as 500 students can participate at one sitting. A projection lantern is converted into a tachistoscope by use of a special variable exposure shutter attached to the barrel of the lens, the exposure cards being photographed on lantern slides. The small size motion picture film can be used for the exposure of nonsense syllables of rigidly controlled rhythms. The principle of the anamoloscope can be adapted to an instrument large enough to be seen by the entire auditorium, a color-blind individual making matches which can be witnessed by everybody at the same time. Crucial experiments, constituting evidence for basic psychological principles, can often be shown by motion pictures when the conditions and subject cannot be submitted to the observation of an audience directly, or when a repetition of the evidence is difficult. Diagrams of the nervous system become animated and 'nerve currents' pass along stimulus-response arcs in terms of the latest information, if advantage is taken of the motion picture animated diagram. By the use of large and specially constructed apparatus, experiments, with some degree of quantitative measurement, can be carried out on all phases of sensation; Weber's Law, memory, motor learning, reasoning, perception, and emotion.

The results of such a method, applied to the conversion of sixteen lectures into as many group experiments, seem to indicate (1) the data from an experiment carry a degree of conviction frequently absent from either textbook or lecture; (2) the student gets a first hand demonstration of methods of securing evidence in an empirical science, a pedagogical fact of some importance in a subject afflicted with a large amount of speculative assumptions; (3) the student is exposed to the subject matter more slowly and more thoroughly, a procedure which counteracts some of the effects of poor teaching in the lectures of scientists who are prone to hurry so rapidly over a great mass of technicalities that untrained and immature students cannot obtain an accurate view of material; (4) the student is taught to check his opinions against real observations under competent direction; and (5) examination scores have shown a distinct improvement.

J. H. Forsberg. *The Understanding and the Memory.*

In the case of practical study we are concerned with processes different from those involved in the case of either mechanical 'cramming' or pure thinking. Hence it is necessary to make investigations of ordinary, natural study in order to arrive at indications of the various types of processes and of their frequency and importance. *" Förstaende och minne"* (understanding and memory) is such an investigation of how adult students at different stages work.

We understand (1) indirectly by associating the new impression with known experiences, or (2) directly by spontaneously experiencing another person's feelings, or emotionally reacting to an impression. Thus we grasp a perception by assimilating and classifying, establishing a causal connection. Linguistic expressions are understood by the formation of corresponding images, by the imitation of thought-operations, or by our own thought combinations. In biology (medicine), geography, physics, *etc.,* visualizations of objects, apparatus, *etc.,* play an important part at all stages (and not only in the case of the beginner). Such visualizations are often schematized. The thought-schemes are the reproduced principal features of real processes of thought. Usual types are classification (often by conceiving the type in the concrete) and the assimilation of the matter by a certain method of solution. The subjects are characteristically distinguished from each other by the character of the thought-schemes, by the frequency of visual images, and by certain central thoughts. The analysis of these peculiar characteristics of the subjects is of importance for pedagogics and psychotechnics. By mental participation (*Einfühlung*) we can distinguish between identification and mental participation in the wide sense of the word (*Mitfühlung*). When imagining a stage where *A* and *B* appear, if I identify myself with *A*, I see only *B*. The study of the interplay between identification, other types of mental participation, and images is of importance for the analysis of works of fiction and for stylistic questions.

A selection of points of *appui* for the given complexes or those formed by the understanding is impressed on the mind by repetition. The methods employed are: underlining, summarizing, transformation into images, stabilization of a general impression, individual logical combinations, applying methods of solution, and mnemotechnics. The way in which one understands something and the method of impressing on the mind should be adapted to the matter involved and the individual concerned.

J. C. Foster. *Hours Spent in Sleep by Young Children.*

This is a summary of records kept by mothers on the sleep of children less than 8 years old. For one week they recorded daily the time of going to bed, time of falling asleep, time of waking and various other items. Reports were obtained on approximately 1,000 children for each of the four seasons. The data obtained show that most previously published figures err in expecting too much sleep, especially at the younger ages. Means of total sleep taken during twenty-four hours range from 15 hrs. 6 min. for children less than 6 months of age up to 10 hrs. 58 min.

for children 7 years old. Variability from child to child decreases with advancing age. The gradual loss in total sleep is due almost entirely to the dropping of the day nap. The day sleep is reduced with advancing age, not by shortening the mean length of the nap but by reducing the number of naps taken during the week. The bedtime moves gradually from 7 o'clock at age two to 8 o'clock at age seven, while the time of waking in the morning shifts only from 7 o'clock for age two to 7:15 for age seven. The time of waking is somewhat later in winter and in summer than in spring and fall. The time taken for going to sleep is approximately 20 minutes for all ages and all seasons. No sex-differences were found in the data. There seems to be some tendency for the children of the better educated mothers to take more naps and to take a greater amount of total sleep. The city children were found to sleep longer than either the town or the country children. The rural children go to bed later and get up earlier than either town or city children. This difference is particularly striking in the spring.

J. C. FOX, see R. DODGE.

FRANK S. FREEMAN. *Inadequacies of the Correlational Method in Predicting Academic Survival.*

There are too many factors which contribute to the several degrees of success or failure in college work to permit of a valid prediction of scholarship on the basis of correlations between aptitudes tests and course marks. For the purpose of this paper the validity of the tests themselves may be granted. We may also for the present ignore such variables as differences in marking-standards and differences in the difficulty of courses. It is the purpose of this paper to point out that even should these factors be eliminated there still remain sufficiently elusive variables to make the coefficient of correlation a very doubtful index for purposes of prediction.

Most correlational studies of this subject have yielded coefficients close to 0.50, with an occasional index in the neighborhood of 0.60, and with some falling below 0.40. However, 0.50 is approximately the central tendency. An index of this magnitude is hardly an adequate basis on which to proceed. But if we go beyond the mere examination of correlation coefficients we may find that the aptitudes tests are not of as little value as the coefficients at first suggest. Many students of superior ability do poorer scholastically than is expected of them for one or several of a number of reasons. In a recent investigation the writer found the following reasons frequently offered to explain the relatively poor scholastic records: lack of interest, poor habits of study, loafing, extra-curricular competitions, work for self-support, independent reading, and social activities. Yet in no case did any of this group of students fail to pass his courses; they did enough work to obtain credit. This in itself will reduce the coefficients of correlation. It was found also that there is a small but persistent number of students whose rank on the aptitudes test is rather low, but whose scholastic performance is creditable. They are the individuals who are the genuinely slow but accurate performers; those also who are slow to adapt themselves to new conditions. These cases further reduce the coefficient of correlation. Add to these reasons the fact that among the remaining students relative rank in the aptitudes test and in scholastic performance may shift for a variety of reasons, and we realize further the inadequacy of correlations.

Correlations derived for decile ranks on the aptitudes test, and scholastic averages for academic terms varying from one to eight, ranged from $0.53 \pm .024$ to $0.27 \pm .039$, most of them being below 0.40. These are of low magnitude and of very doubtful value for purposes of prediction. But it would be a mistake to reject the aptitudes test as an instrument for determining a student's fitness for college study, for an examination of groups which have been eliminated and those which have survived, regardless of scholastic averages, will reveal a definite trend toward increased elimination as the decile ranks descend. The same is true respecting students placed on probation or dropped for a term because of unsatisfactory grades.

These facts are not revealed by correlational studies. It is important, therefore, in determining the true value of an aptitude test, that we study rather the *survival qualities* of the decile groups. Thus it may be possible to establish a *critical* level.

R. G. Freeman, see D. Wechsler.

J. P. Froloff. *Physiological Doctrine on Conditioned Responses in Industry.*

1. Modern industrial life sets a number of tasks before the branch of science dealing with man and his labor. Labor is the most complex form of human behavior. In so far as man and human collectivity remain in the center of the productive process, the study of anthropology in its broader meaning, *i.e.* the investigation not only of forms of the human body but also of the functions of man in their professional and social aspect, is one of the most important branches of science.

2. Although the practical value of results obtained in a purely empirical way in the province of professional selection is beyond doubt, it must, nevertheless, be admitted that modern psychotechnics lacks the broad natural-scientific basis underlying modern medicine, and the fact is strongly felt by the modern representatives of psychotechnics.

3. The inevitability of a fusion of psychotechnics with the natural sciences is most clearly realized when considering the choice of a profession from the standpoint of *social hygiene.*

4. A deeper analysis of the dynamics of nervous processes (*excitement* and *inhibition*) made by physiologists permits us to-day to tackle the determination of the *so-called type of higher nervous activity* by means of a series of purely physiological tests, which must provide us with a definite criterion for the *professional type* as well. The problem of temperament and character, which is the most difficult problem of modern psychology, is, thanks to its physiological interpretation, quite satisfactorily brought into harmony with the theory as well as the practice of life.

5. A physiological conception of the problem of practical anthropology in its broader aspect enables us, not only to criticize the old achievements, but also to trace new ways in this branch, that is to say, to build up a rational system of collective as well as individual tests, to take into account the aptitude for exercise respecting liability to fatigue, to analyze different systems of education, to determine the limits of the automatization (of habits), *etc.*

Douglas Fryer. *An Acceptance-Rejection Theory for Both Subjective and Objective Measurement of Interests.*

The measurement of interests has held the attention of applied psychologists in industry and education in America for a little less than a decade. Research has been based upon the subjective analysis of interest by psychologists of the last half of the nineteenth century, defining interest as feeling, an element of experience, or, if not a mental element, as a complex thought-experience with a strong feeling component. For purposes of subjective measurement interests have been defined as the stimuli causing the subject to estimate his feeling-experience as to quality and as to intensity.

Standardized interests-inventories have been developed with occupational, educational, and general stimuli and an objective scoring technique has been devised in which the aim has usually been to separate groups, particularly professional and occupational groups, from people in general, by their interests. This work is the product of a long line of investigators: Yoakum, Moore, Ream, Freyd, Kornhauser, Paterson, Hubbard, Hartson, Cowdery, Strong, and others. This research leads to a definition of subjective interests as estimates of feeling-experience, which are named by the objects of their stimulation as interests (likes), indifferences, and aversions (dislikes). The inventory method groups these estimates into an objectively defined score.

Is there an objective side of interest in behavior? It would appear to be either: (1) the direction taken by the reaction or (2) the drive of stimulation. The efficiency of reaction is taken as the measure of abilities. The direction taken by the reaction may be the objective aspect of interest. A turning toward the stimulus would then be the objective correlate of subjective interest; a turning away, the correlate of the subjective aversion, and no turning, the correlate of the subjective indifference. There have been few objective measures of interests. Work upon the Information Test of Interests by Robinson, Burtt, Terman, and McHale, upon the Free Association Reaction Test of Interests by Wyman, upon an Association Test and Distraction Materials Test by Burtt, completes the list to date. Of these tests the Information Test and the Free Association Test appear to be tests of direction taken by the reaction. The Association Test and Distraction Materials Test appear to be tests of the drive of stimulation. This factor in behavior is distinguished from interest and defined as motivation, with its subjective correlate the dynamic factor in experience.

The measurement of interests, subjectively and objectively, would appear to define interests for us as acceptance and rejection of stimulation. Subjective interests, or inventoried likes, are acceptances; subjective aversions, or inventoried dislikes, are rejections. Objective interests, or turnings toward stimulation, are acceptances; objective aversions, or turnings away from stimulation, are rejections. The acceptance-rejection theory of interests has both subjective and objective application for the development of measurement. A crucial experiment is the correlation of these two aspects.

PAUL H. FURFEY. *The Measurement of Developmental Age.*

Growth involves something more than increase in stature and general intelligence. The growing child shows characteristic differences of behavior as he advances in years. The adolescent differs from the pre-school child not only by being larger and more intelligent but by having different interests, different attitudes, and a different outlook on life.

"Developmental age" is chosen as a term to denote this increasing maturity of behavior. The idea itself has been described and discussed since the very beginning of child psychology; but the present investigation attempts for the first time to measure it quantitatively and to study it under controlled conditions. Two methods are being used—a paper-and-pencil test and a series of case studies.

A form of the test for boys has already been standardized on a group of 450 subjects. It yields a reliability of 0.75, which is quite satisfactory for the length of the test. A form for girls is being worked out at present.

In order to supplement the test results a series of case studies are being made. At present 150 case studies of boys have been completed, while the work with the girls' cases is just being organized. The children who are being used in the boys' series were carefully selected as typical of American urban life. Each child is being studied within one month of his birthday at the ages of six, eight, ten, twelve, fourteen, and sixteen, thus covering the entire period from the beginning of school life up to and including puberty.

An effort is being made to bring to bear on each case the usual procedure of the guidance clinic, including physical and mental examination, a case-work study of the home, and personality studies. The result will be a series of cross-sections of child life at successive periods.

The case-work technique and the test technique supplement each other. The former gives a more rounded picture of the individual while the latter gives a quantitative measure of development which may be subjected to statistical analysis. It is believed that the two techniques combined represent the most powerful instrument at present available for the scientific study of child development.

A. McC. Gamble, see M. W. Calkins.

Henry E. Garrett. *The Location and Measurement of Independent Mental Factors.*

Both Spearman and Kelley have located factors which they regard as unitary in mental life. If such factors or aptitudes are strictly ' independent ' there is considerable doubt as to the usefulness of the term ' general intelligence.' I wish to present briefly a technique for locating and measuring ' mental traits,' together with some theoretical implications which the method involves.

HENRY E. GARRETT. *An Experimental Attack on the General Factor,* g.

It is Professor Spearman's contention that a general factor which he calls *g* permeates all cognitive functions to a greater or a lesser degree. In fact, since group factors are not very numerous in Spearman's system most of the correlations found among tests must be attributed to *g,* as other factors are specific to the tests themselves. How important is this general factor, assuming that it can be located, and can it be explained in any way except as a unique characteristic of mental life?

We have tried to answer this question experimentally in the following way: two groups of four tests each, one a battery of ' verbal,' the other a battery of ' number ' tests, were selected. These tests were given to two hundred college students. The group was homogeneous as to age, sex, race, and approximately as to school background or culture. Test reliabilities were high. Using Spearman's technique, the correlation between each verbal test and the factor central to the group for verbal tests (tentatively called V) was computed; and the same procedure was employed with the number tests, the central factor here being called N. The correlation between V and N was computed and found to be 0.26. The following conclusions are drawn.

1. Possibly *g* may be thought of as the general factor represented by the correlation of 0.26 between what is central to the two groups of tests. If this is the case *g* is very small, and the overlapping of common elements in V and N is no greater than 10 per cent.

2. It seems more reasonable to attribute the $r = 0.26$ to the common language medium inevitably present in all eight tests. Thus the existence of the general factor—apart from common

language usage—seems doubtful, while the importance of such a factor, however explained, must be slight.

C. R. Garvey. *An Experimental Study of the Sleep of Pre-School Children.*

The method of the instrumental recording of changes in bodily position during sleep, developed by H. M. Johnson with adults at the Mellon Institute, has been used with children. An intensive study has been made by taking nightly hinetograph records on 12 children, ages 2–5, over a period of a year, and a larger number of children are being studied for periods of approximately a month each.

The average length of rest period varies from night to night in the same individual and from one individual to another, but the general average is about 7.5 minutes. This is less than Johnson's corresponding figures for adults, but is affected to some extent by the fact that the children become quiet much less promptly on going to bed. Although children move more often on the average than adults, they seem to lie still longer at some one time during the night. They often lie still for an hour or more at a time, while adults seldom lie so long without stirring.

While the data are not yet completely analyzed, a preliminary survey indicates that there are no seasonal differences in average rest period, probably no consistent sex-differences, but some significant individual differences. There also seem to be differences in the form of the curve of activity during the night, characteristic of the various individuals. Activity is not distributed at random over the night, a fact which is shown by making a composite activity curve on a single individual over 50 consecutive nights.

The relations between various conditions and the quietness of sleep are being studied, such as the child's health, body-temperature, room-temperature, basal metabolism, daily activity, emotional excitement in the evening, hemoglobin, *etc.* The effect of violet ray treatments and habitual sleeping position are also being studied in coöperation with members of the research staff at the

Institute of Child Welfare under the direction of Dr. John E. Anderson and Dr. Florence L. Goodenough.

ARTHUR I. GATES. *Some Influences of Facts and Theories of Transfer upon Education.*

The facts concerning the transfer of training must be accredited almost wholly to studies initiated by psychologists—by James before 1900, and by Thorndike, Woodworth, Judd, and others shortly after 1900. These facts, and the theories based upon them, have already profoundly influenced educational practice and theory in America and promise to be fundamental to further advances.

As example of the many current movements which are based largely on principles derived from studies of transfer, the following may be mentioned: (1) the newer type of school management which seeks to provide for each child not a cloistered existence but a 'full' and 'real' life; (2) the recent movement in the reconstruction of the curriculum which seeks objectively to select subjects and activities on the basis of utility in business and social life, and (3) the reorganization of school subjects to harmonize with the principles of 'psychological facilitation.' The present paper deals mainly with the last tendency.

Although the methods of teaching, current prior to 1910, which assumed that the pupil could transfer acquisitions from the learning situations to very different settings, are still in wide use, the results of the early studies of transfer led many educators to adopt procedures at the other extreme at which learning was conceived as entirely specific. Recent studies have shown, in comparison with both extremes, the fruitfulness of setting up and organizing the subject in a series of situations designed to emphasize the bases of transfer and to make transfer possible by reducing the difference between learning situations to gaps that may be successfully bridged or jumped.

While there is room for great improvement in most school subjects along lines already tested, greater insight into the nature and conditions of transfer is needed for further advances in other fields. Some of these researches suggest, furthermore, that further studies of transfer of training may reveal the principles needed to explain the nature of facts now variously treated under insight, understanding, generalization, and intelligence, topics under which are incorporated some of the most puzzling disputes concerning educational practice.

Robert H. Gault. *On Discrimination of Forms of Speech by Tactual Stimulation.*

Certain exploratory experiments have suggested the hypothesis that sentences and continued discourse may be better interpreted by the deaf in conditions of dual stimulation (feeling speech, the energy of which is instrumentally communicated to the finger tips, *e.g.,* and *simultaneously* seeing it on the face of the speaker, as in 'lip-touch-reading') than in conditions of visual stimulation alone (as in straight lip-reading). A total of 124 records furnish support for the hypothesis. Where does the advantage arise?

1. Data are set forth that demonstrate the superiority of the organs of touch alone to the lip-reader's unaided eye as discriminators of certain homophenous words (words that look alike on the face of a speaker). An aggregate of 307 words were employed as stimuli in the tests on this point. They fall into 102 groups of two, three, *etc.,* up to ten words each that are alike as the lip-reader sees them. Analysis indicates that the tactual characteristics of certain initial and final consonants are in many instances the criteria by which touch surpasses the eye in making discriminations.

2. In respect of the localization of accent, data are presented that embody 1,200 reactions of one deaf subject. Three experimenters, one of them a total stranger to the work and the purpose, pronounced the stimuli. These were repetitions of a bi-syllabic nonsense form, accented now on the first syllable and now on the second. The subject is a fair lip-reader, 28 years old. Her localization of accent by touch was approximately 25 per cent superior to localization by lip-reading.

3. Several hundred reactions by three deaf subjects, ranked as fair lip-readers, indicate approximately a 40 per cent superiority of the sense of touch for becoming acquainted with the number of syllables being spoken.

In the results suggested above, we have some, though not sufficient, clues to the superiority of 'lip-touch-reading' over lip-reading. Undoubtedly the eye is superior to touch in many relations.

Experiments are now in progress to compare touch and vision as discriminators of consonantal and vowel qualities, tempos, rhythms, pitches, and as localizers of emphasis. Other experiments will compare the facility of learning to identify sentence patterns as wholes by touch and by eye, respectively. The sum of this work will afford a picture in detail showing wherein lies the advantage of dual stimulation for the interpretation of speech.

J. A. GENGERELLI. *The Law of Least Effort in Animal Behavior.*

A series of experiments were performed with blinded and normal white rats to determine the nature of the path which the animals would eventually select from an indefinite number of possible paths leading to food. The animals entered by one corner of a platform 6 ft. by 6 ft. which was enclosed on all sides by a wall 5 in. high and covered with wire-mesh. Food was placed at the corner diagonally opposite the entrance corner in a small food-box which was outside of the platform and which the animal entered by means of a short alley leading to it. Both food and observer were invisible to the animal.

It was found in practically all cases that the path finally chosen by the animals (both normal and blinded), when all possibility of olfactory orientation was eliminated, was the path of 'least effort,' namely, the path whose distance was a minimum. In the experiments where there were no obstructions on the platform, the actual path finally chosen was the diagonal from the entrance corner to the food corner. The behavior of the rats can be most accurately described by stating that the path which the animals finally chose served as a limit to which they approximated more and more closely with each successive trial.

A number of interesting variations and complications of the above experiment were tried with the same result. A problem box situation constructed in accordance with the above principles elicited behavior from the rats in striking agreement with that observed in the platform situations.

It is suggested that the above law is of fundamental importance in learning and other allied processes in the rat.

Arnold Gesell. *Systematic Aspects of Developmental Psychology.*

Development has become one of the major problems of the biological sciences. Embryology, developmental anatomy, the biochemistry of growth, the physiology of development, the biometry of individual and population growth, the physiology and biology of twinning, and experimental teratology testify to the pervasiveness of the concepts of growth and development. In various ways developmental psychology bears relations to these fields of study. Growth (or development) may be regarded as a unitary complex which can be investigated analytically or organismally with regard to function as well as structure.

Developmental psychology investigates the phenomena of growth as expressed in behavior. Patterns of behavior become fundamental data because ontogenesis manifests itself in lawful progressions and correlations of pattern. Patterns of infant behavior may be classified into six different groups: (1) patterns of specific behavior; (2) correlated patterns of behavior; (3) durational patterns of behavior; (4) patterns of maturity; (5) patterns of genetic sequence; (6) biogenetic patterns. The number or moments of pattern approach infinity, and scientifically it is necessary selectively to delimit areas of investigation. This result can be systematically accomplished by normative methods of approach.

The normative formulation of different kinds, grades and groupings of pattern is essential for individual psychology, both genetic and clinical, and is essential likewise for a systematic comparative psychology of development. Psycho-developmental correspondences and differences between species, between races, and between individual types can be systematically established only by means of quantitative and normative criteria which will express the interrelations between age, behavior, and life cycle.

The observational arrangements and methods in use at the Yale Psycho-Clinic for the developmental study of infancy are outlined and illustrated. Systematic photography is described as a technique for recording and for analytic and comparative investigation of behavior pattern. Instantaneous and cinema records, secured under controlled conditions, are used to define characteristic patterns of performance and to establish developmental increments and sequences from age to age. Through cinema analysis, details of pattern and configuration phenomena can be quantitatively expressed and seriated. Cinematography and normative pattern-specification become an aid to the charting of behavioral growth, and to other systematic phases of developmental psychology.

ARNOLD GESELL and HELEN THOMPSON. *A Method for the Normative Study of Behavior Development in Infancy.*

A statement of provisions, procedures, and methods of observation and record used in the normative aspects of the developmental research at the Yale Psycho-Clinic. Healthy, full term infants from 'average' homes (selected with regard to social, economic, and racial status) are systematically observed at lunar month intervals throughout the first year of life. From 16 weeks to 52 weeks the observations are made at the Clinic in the presence of the mother. She, and a stenographic recorder, are concealed by a one-way vision screen during the period of developmental examination. This examination comprises postural, locomotor, perceptual, communicative, social, and adaptive behavior. Defined procedures are used in the presentation of stimulus objects and in devising test situations, which are repeated in later examinations objectively to establish developmental sequences and changes in behavior pattern. Naturalistic observation is combined with experimental test procedure; and the behavior is immediately described as it occurs, to a stenographer. The typed report is supplemented by photographic, anthropometric, and interview data. The records are quantitatively analyzed with special reference to the entire patterning of behavior rather than to discrete items of behavior. Consecutive records of the child furnish evidence concerning variability and persistent individuality in personal patterning.

A preliminary report of the normative behavior characteristics of the 20-weeks old infant is offered, with illustrative material, to show the nature and treatment of the data. The incidence and correlation of behavior patterns at 20 weeks are brought into developmental comparison with 16 weeks and 24 weeks. The significance of norms is critically discussed, with special reference to genetic interpretation and clinical application.

FRANK B. GILBRETH. *Skills and Satisfactions.*

The engineering world has long been interested in skill and its transference. Committees of the American Society of Mechanical Engineers have formulated the findings of the management group in that society into various papers and reports which may be found in the *Proceedings*. There has been difficulty in defining skill, in measuring it, and in determining its effect upon the product and upon those exercising it.

The Motion Study Group, both the research group who are making applications in industry and the group in the laboratory at Montclair, are attempting to combine the findings of engineering and psychology and to offer such techniques of motion study as may be serviceable in solving the problems involved. Associated with this work have been a group of students in the Department of Social Economy at Bryn Mawr who have made investigations in the industries of Philadelphia and whose work is being recorded and developed in two theses having to do with skills and satisfactions.

It would seem a duty of psychologists to coöperate in this work, to define skill, to submit objective measures, and to determine the possibility of transference from man to man and from man to machine.

The Motion Study Group submit the techniques of the micromotion method and the chrono-cyclegraph method as furnishing methods of measurement. Recently, tentative gradings of skill of a man on a particular job have been developed, also the classification of elemental sources of satisfaction. These are ready to be submitted for criticism, as are certain tentative criteria of skill which must be tried out coöperatively by engineers and psychologists if a complete plan of continuing this investigation is to be arrived at.

A. R. Gilliland. *Individual Differences in Age of Mental Maturity.*

During the last quarter of a century there has been much study and discussion of individual differences in the rate of mental development. Such studies have raised the further question of the age at which mental maturity is reached. There has been much difference of opinion on this latter problem, with some giving 14 years as the average, while others have claimed that intelligence continues to develop until middle life; but most students of the problem have given one age or another with little consideration of differences between individuals.

It seems just as reasonable to suppose that individuals differ as much in the age at which they arrive at mental maturity as in the rate at which they arrive. We do not know whether these factors are related or independently variable although some evidence points toward the latter.

Records of physical growth show that the age of physical maturity varies greatly for different individuals. We are handicapped in any similar study of mental maturity by the lack of any good test which can be used consecutively for several years with maturing youth. In lieu of such a test we here present the intelligence test records of a group of college students who were tested at different times during early and later adolescence. From these data we find strong evidence, after allowing for differences in the tests, that there are great individual differences in the age at which maturity—whatever its level—is reached. Probably such differences are nearly or just as great as the rate at which mentality develops. These facts may help explain some of the inconsistencies in ordinary test results.

Clyde W. Gleason. *The Induction and Measurement of the Early Stages of Sleep.*

The problem is dual, consisting in the assembly of a battery of measures of the depth of drowsiness, and a test of the hypothesis that the imposition of a delay between an initial and a final stimulus may serve to induce drowsiness.

Certain measures of drowsiness have been employed in the study, including records of head and body movements, breathing, reaction-time, and efficiency in a 'pursuit task.' Present construction of a superior experimental set-up involves improvements in all but the last item, the substitution of an 'alertness' choice-reaction test for the pursuit task, and, in addition, a measurement of electrical body resistance.

The stimulus consisted of four colored lights or chime sounds of four pitches, in a continuous series, in chance order, and for an indeterminate period. The subject waited for a known pattern before making a reaction which started a series of multiple choice problems. The assumption is that the 'watchful waiting' will induce drowsiness that may be measured by decreases in movement, breathing, changes in electrical resistance, and decreases in efficiency for the task which follows the waiting period.

The results of preliminary studies involving twenty subjects, and aggregating several hundreds of hours of 'stimulus' and 'control' periods, while variable, serve to indicate the validity of the proposition that the delay serves to induce drowsiness, and that the drowsiness may be roughly measured by the battery of tests and indicators.

Phenomena of some interest are (1) the appearance of waves of drowsiness and (2) the hypnotization of certain subjects under the same external conditions which induced normal sleep or drowsiness in most of the rest.

Plans for the immediate future are (1) the perfection of reaction indicators, (2) a study of relative efficiencies of stimuli of various sense modalities, as inducers of drowsiness, and (3) special attention to the hypnotic phenomena as regards their relationship to the sleep state.[1]

FLORENCE L. GOODENOUGH. *Interrelationships in the Behavior of Young Children.*

The purpose of this study was to ascertain the nature of the interrelationships existing between certain modes of behavior, physical characteristics, mental and emotional traits, and factors in the social background, of young children; and to determine what changes take place with age, and which relationships seem relatively independent of age factors. Thirty-three nursery-school children ranging in age from 27 to 59 months were used as subjects.

The 24 variables and their methods of derivation were as follows: Group I (method of short samples), *laughter, compliance, sociality, leadership, physical activity, talkativeness;* Group II (formal tests and measurements), *mental age* and *IQ* on Minnesota test for pre-school children, *mental age* and *IQ* on Merrill-Palmer performance scale, *standing height, weight, hemoglobin test;* Group III (combined estimates of 12 judges), *beauty, attractiveness of personality, introversion-extroversion* by Marston rating scale, *extent of maladjusted behavior* by Olson rating scale; Group IV (nursery-school records), *chronological age, sex, number of days' attendance at nursery-school, occupational status of father, size of family, position in family,* and a rating on *general physical condition* given by the nursery-school pediatrician.

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[1] The study was carried on in the experimental laboratories of the Department of Psychology at Ohio State University, and extended over more than a year. The present construction and experimentation is being conducted in the laboratory at the University of Pittsburgh. Most of the work, to date, has been done by Professor Clyde W. Gleason, at the University of Pittsburgh. Mr. Vernon L. Miller, of the same department, is actively participating at present.

The reliability coefficients of the separate measurements are, in general, high. The inter-correlations show little relationship between physical traits and intelligence-test scores, when age is 'partialed out.' Many of the personal-social traits, such as sociality, leadership, extroversion, and talkativeness, appear to be about equally related to standing height and to intelligence-test standing, the inter-correlations being of about the order of 0.3 to 0.4 when age is held constant. Weight, however, shows little relationship to personal-social characteristics. The highest correlations with chronological age are shown by standing height ($r = 0.83$) and mental age ($r = 0.80$). Of the personal-social traits considered, leadership and sociality seem most closely related to chronological age. A number of the inter-correlations within the personal-social group show a tendency to curvilinear regression, while correlations between intellectual and physical traits usually show linear regression.

FLORENCE L. GOODENOUGH. *Mental Tests for Pre-school Children.*

Because of the extraordinarily rapid rate of mental growth during the first few years of life, the development of mental tests suitable for these ages is a problem of fundamental importance. Until recently, the only tests available for the purpose were those assigned to the lower ages in the scales designed primarily for school children. These portions of the tests were less adequately standardized, and until recently were used chiefly for the measurement of the lower grades of mental deficiency. For this purpose they were fairly adequate, since it does not greatly matter whether a twelve-year-old imbecile is thought to have a mental age of three or of four years. For the child of three, however, an error of one year in the mental age may mean the difference between a diagnosis of average development or of extreme precocity, or between normality and feeble-mindedness. Obviously, if the mental-age technique is to be used at these early ages, much more precise measurement is necessary than in the case of older children. Moreover, it is doubtful whether normal young children and imbeciles should be measured by the same standards, since differences in life experience, in interests, in emotional characteristics, in physical development and in motor skill are so great. Measurement in terms of dispersion within comparable chronological-age groups is probably to be preferred to the use of a constant series of standards during the early years.

Increasing recognition of these difficulties has led to a number of attempts to construct tests for special use with young children. Gesell's work in this field is outstanding, although the standardization of his tests has not yet been brought to a point which makes them suitable for general use. The Merrill-Palmer tests have high interest value for young children, make small demand upon language, but stress the speed factor. Linfert and Hierholzer have developed a series of tests for infants, the value of which has not yet been determined. At Minnesota, work on a more finely graduated scale of the Binet type for use with young children is now being completed.

The rapid growth-rate and the relatively small overlay of experience renders the pre-school years the optimal period for the scientific study of mental development. Since the most complex problems become simplified if traced from the beginning, the present interest in the early stages of mental growth promises much for future understanding.

M. V. Gopalaswami. *The Psychogalvanic Reflex as an Indicator of Consciousness of Guilt.*

The psychogalvanic reflex may be briefly defined as "the change in the electrical behavior of the skin during a state of emotional excitement." The fact that the reflex is markedly increased where external manifestations of the excitement are suppressed ought to make it particularly useful in connection with the detection of crime. On the other hand, since the reflex indicates only roughly the *intensity* of the excitement, irrespective of the *quality* of the emotion, the method is beset with many pitfalls. The present paper reports an attempt to devise a technique which will make a clear distinction between the reactions of the guilty and those of the innocent.

Apparatus. A Wheatstone bridge in conjunction with a d'Arsonval mirror galvanometer, as described by Whately Smith.

Procedure. Each patient is required to answer a large battery of questions, and the resulting psychogalvanic reflex is recorded. The questions are of two kinds, 'criminal' and 'non-criminal.' The 'criminal' questions refer to the various incidents, personalities, motives, *etc.*, of the crime, while the 'non-criminal' questions are calculated to provoke emotionally any normal person.

Treatment of Data. Rough measures of criminal complicity were obtained by dividing the psychogalvanic reactions of each patient for the 'criminal' questions by that of his own reactions for the 'non-criminal' questions; thus:

$$\text{Criminal Index I} = \frac{\text{Median reaction for criminal questions}}{\text{Median reaction for non-criminal questions}}$$

$$\text{Criminal Index II} = \frac{\text{75 percentile reaction for criminal questions}}{\text{75 percentile reaction for non-criminal questions}}$$

The relative value of these methods is determined in the light of the independent findings of the courts of law.

Results and Conclusions. Altogether 36 persons have been tested in the laboratory in connection with various offenses, such as murder, theft, treasury defalcation, *etc.* An examination of the results appears to indicate the following conclusions.

1. The method of word-association shows a greater crucial difference than that of questions; but it is not easy to apply the free association test to illiterates.

2. Single questions, unless repeated many times, have not much diagnostic value.

3. Making a person swear that he is innocent has absolutely no diagnostic value.

4. A guilty person tends to give high reactions for actual as well as fictitious materials bearing upon the crime; he reacts highly to both the crucial and the control questions.

5. Questions which are impersonal and which do not convey any accusation against the patient, are more effective than those which, either directly or by implication, connect the patient with the crime.

6. Guilty persons who admit the offense show lesser reactions than those who do not.

7. Persons who have been convicted previously for similar offenses show a greater galvanic reaction that the 'freshers,' although often it is the latter that show emotional excitement in their facial expression and general behavior.

8. The median reactions do not yield such crucial differences as the 75 percentile reactions. Criminal Index II never rises higher than 1.3 in the case of known innocent persons, and it never falls below 2.0 in the case of persons of established guilt. *Criminal Index II always shows a clear difference between the guilty and the innocent.*

Kate Gordon. *Beauty and Memory.*

The Oriental artist, it is said, studies his model, but paints from memory. His practice suggests the theory that the beautiful and the memorable are one, or that they, at the least, have much in common. Experimental psychology affords some evidence in support of such a theory. Thus, rhythmic pattern and spatial order, which are elements of beauty, have long been recognized as aids to memory. It cannot be maintained that the merely pleasant is more likely to be remembered than the unpleasant, but neither is it tenable that beauty is merely pleasant. Esthetic theories make much of the concepts of the significant, the characteristic, the distinguished, implying that only the incoherent or the insipid are not beautiful. Significance is the key to memory. In some instances, meaningful material is memorized ten times more readily than meaningless material of comparable intricacy. It is not easy to measure meaning, but the task is not hopeless. Sensuous form is usually reckoned as an essential of beauty, and this, too, deepens the memory impression.

R. G. Gordon. *The Physiological Basis of Repression and Dissociation.*

Repression and dissociation are mental processes which underlie many psychoneurotic and psychotic symptoms, and also behavior in normal individuals. If we accept the correlation of behavior usually described as mental with the activation of groups of neurones, we have in the form of neuronic patterns the correlates of mental processes. At reflex levels we can trace the neurone paths with considerable accuracy. At higher levels we cannot follow the actual neurones but we recognize functions at various levels, such as vegetative regulation in the nuclei of the fourth ventricle, primitive affect and painful perceptions at the level of the thalamus, and coördination, integration and discrimination at cortical levels. Thus we may conceive complex neuronic patterns involving neurones at all levels, and these patterns become more easily activated the more often the activation passes over them.

Such a pattern is not necessarily static for it may exert an influence in virtue of the significance of its form. Normally such patterns are harmoniously integrated and may exhibit reciprocal activity so that no pattern interferes with another and each works in with all. However, such smooth action breaks down at times. This exception may be exemplified in hysterical paralysis when the reciprocal action of agonist and antagonist is replaced by a synchronous contraction of both. Imperfect cancellation of the action of one by the other leads to tremor of varying rhythm and excursion. Similar disturbances of integration and analogous tremor may be observed in the vegetative, especially in the mixed vagotonic and sympatheticotonic, symptoms which accompany anxiety states. Similar phenomena occur at emotional levels and are characteristic of schizophrenic reactions.

Repression consists in the cancelling out of two complex neuronic patterns teleologically antagonistic with a greater or less 'tremor' effect in the form of symptoms or dreams. It is significant that repression tends to occur in the introvert.

Dissociation may be represented as two such patterns directed to diverse objects in the environment, which fail to find any contact and between which no activation is able to pass. It is noticeable that dissociation is associated with extraversion, just as extraversion and introversion, or dissociation and repression, are not necessarily mutually exclusive in the individual.

When these phenomena are met, it is presumptive that the functions of integration and discrimination are at fault, either from inherent disability or as a result of psychical or physical trauma.

MABEL ENSWORTH GOUDGE. *Abnormal Psychology in General Medical Practice.*

Many patients come to a physician's office complaining of various symptoms that might indicate (1) an organic nervous disease, (2) some other somatic disease, (3) a maladjustment on the basis of an organic nervous or other somatic disease, or (4) a maladjustment of psychogenic type. In many of these medical cases of maladjustment the prominent symptoms tend to be more definitely referable to the autonomic nervous system than in the cases handled by the clinical psychologist. It is generally recognized, at least by the psychologist, that, if a case is one of a difficulty in adjustment, then the use of psychological methods in the examination and treatment ought to be essential. However, the importance of maladjustment on the basis of a disabling physical condition is not sufficiently well recognized. The developmental history of personality reaction-patterns is necessary for discovering the origin of the maladjustment. In order to understand fully these developmental facts it is frequently necessary to give psychological tests. The problems of discovering such maladjustments, their origin, and the subsequent readjustments of the patient are essentially the province of the psychologist working in the applied abnormal field, *i.e.* the clinical psychologist. Since the physical diagnosis is the physician's province, the closest coöperation should exist between psychologist and physician. Coöperation in treatment is also essential because help may often be given to the patient during the period of psychological readjustment by the use of drugs, organotherapy and physiotherapy. The most adequate handling of such cases would be furthered by the establishment of psychological internships in general hospitals.

George H. Green. *Racial Prejudice in Children of School Age.*

An enquiry has been undertaken (at the request of the Educational Advisory Board of the Welsh Branch of the League of Nations Union, and in collaboration with Mr. Sydney Herbert, M.A., Lecturer in International Politics in the University College of Wales) into questions connected with the source and existence of racial prejudice in children attending the public schools of Wales.

The racial and national groups to which the enquiry was restricted were such as might be supposed to be known to some extent even to young children, viz., British, Americans, French, Germans, Chinese, negroes, Russians, Spaniards and Italians. The investigation was made by means of two questionnaires, the first of which was planned to discover whether prejudice existed or no, and the second to determine the character of the prejudice. Every opinion expressed by the children as justifying a belief was followed up, and its source ascertained. It was found possible to group the sources as follows: school, newspaper, book, home, experience, religious institutions, the cinema.

Indisputable evidence of racial prejudice was obtained, and some evidence that this prejudice is fairly constant in its incidence, independently of the type of school or of the character of the district in which the child is being reared. Further, the distribution of the ascriptions was generally independent of the district in which the evidence was obtained, though it varied considerably with age, and to some extent with sex.

The enquiry has made it possible to say with some definiteness what are the parts played by the several influences investigated in forming hostile or favorable racial opinions, and in a measure to understand why this should be the case. Certain results stand out very clearly, *e.g.* (1) the reasons why the cinema has so strongly influenced opinion regarding the negro and the Chinese, while it has generally failed to affect the opinions of Welsh children regarding Americans, and (2) the reason why books are of greater importance in forming opinions of alien races than either the school or the religious institution. These and other direct results of the enquiry suggest ways in which procedures might be modified in order to make these agencies more effective.

George H. Green. *The Early Family Situation of Edgar Allan Poe and its Influence upon his Later Life and Work.*

A great deal of work of varying quality has been done with the object of connecting Poe's early love affairs with his later life and his writings, while the obvious fact that the character of these early choices itself needs explanation has been generally ignored. Poe's love affairs and his works become far more intelligible if the 'family situation' prior to Mr. Poe's death is taken into account, when the family consisted of Poe himself, his mother, and elder brother and a baby sister.

An appreciation of this situation makes clear much that is obscure in the women of Poe's stories, and illuminates the group of stories of which *Ligeia* is the best and the best known. The personal view of 'conscience' developed in *William Wilson* becomes intelligible. Light is thrown, too, if not upon the reasons why Poe developed the detective story, at least upon the character of the themes he chose as the basis of the mysteries he elucidated. This early 'family situation' helps also to make clear the attitude towards Allan which is the source of *The Murders in the Rue Morgue* and *Hop Frog*. In the early 'family situation' and its first developments, in the first four years or so of Poe's life were laid down the simple 'patterns' which were subsequently elaborated in both Poe's actual life and his life of phantasy.

Coleman R. Griffith. *An Experimental Study of the Nature of Sleep among Athletes.*

A series of studies on sleep, identical with those initiated by Johnson at the Mellon Institute, have been carried out on athletes. The subjects were distinguished members of the University of Illinois football, basketball, and track teams of the past two years. Observations and recordings were taken before, during, and after the regular season for each sport. We were thus in a position to compare the 'normal' manner of sleeping with that which appears under prolonged heavy exercise (and mental stress) and immediately before and after 'big games.'

These experiments verify those of Johnson and others on the relative frequency of bodily movement during the night,—the average period of motionlessness for the athletes stands at approximately twelve minutes. For some subjects the average rest period declines during the season and especially after hard and exhausting games; the overworked athlete appears to be more 'restless' after a hard game than is normal for him. For other subjects there is no noticeable seasonal change, but there is a decline in the length of the rest period after particularly exhausting games. This continues until a nervous type of exhaustion appears, when the average rest period is greatly increased. The change is due, in part, to two or three long periods (as much as sixty or seventy minutes) of absolute motionlessness right after falling asleep. At no other time during the night do such long intervals of motionlessness appear. In most of our subjects the changes that take place in the 'normal' manner of sleeping appear to be dependent upon the temperament of the individual (in the face of such emotional stresses as may occur during the football season) and upon the 'reserve energy' of the subjects. These relationships are the object of further research at the present time.

The sleep records, when taken in conjunction with variations in weight, length and strenuousness of practice periods, injuries, and various types of performance (both field work and laboratory tests), suggest the need of a further consideration of theories of sleep, especially where these theories stand related to the amount and character of bodily movements during sleep.

Coleman R. Griffith. *Experimental Studies on Fitness.*

No aspect of the problem of work is surrounded with more difficulties than that of muscular and mental fitness. The athletic field offers a good many situations where this phase of variability in human efficiency appears under conditions that make experimental observation relatively easy. An adaptation of the Sargent test to the changes in fitness that appeared during the course of a basketball season (five months of heavy practice from November to April and sixteen formal games from late December to April) has suggested that variations in fitness are somehow related to the formula, $E = (W H)/R$, where E means fitness or efficiency, W means bodily weight, H equals average height of five jumps straight up into the air (taken both before and after practice), and R equals reaction time. This equation yields an index of efficiency which may be compared with accurate plotting of shots attempted and made, coach's estimate of playing form, and total distance traveled during games.

Two of the factors which have to do with the height to which a man can jump have earned special study, viz. the rate at which the bodily muscles are contracted (viscosity) and the total energy with which they are contracted. Our studies show that both of these factors are highly subject to 'fatigue,' but that, under ordinary conditions, no factor is quite so relevant as 'initiative.' Our studies also point out quickly and accurately individual differences in fitness while scores made before and after practice periods, when taken in conjunction with the seasonal trend, suggest a difference that may be said to stand in direct correlation with reserve energy or endurance.

Coleman R. Griffith. *Measuring Reaction-Time to Muscular Load.*

Most of the studies on reaction time have been concerned with reactions to visual, auditory, tactual and verbal stimuli. These are the usual sources of stimuli but there is one place in athletics and in industry where a different type of stimulus and response appears, viz. reaction to a load which the muscles are already carrying or from which they have just been released. A wrestler, for example, who is on the defensive must learn to react quickly as his opponent feints for this or that hold. A similar type of reaction appears in the handling of drills and many other pieces of machinery.

The following method has been devised to study reactions of this type. Two powerful magnets are mounted beneath a solid table. The two magnets have a common solenoid upon which is erected a carriage which stands above the table. The carriage provides a handle which may be firmly grasped by the subject. It carries also a writing-point which is to be kept on a line marking the center of a band of paper sliding past the writing point. A second pendulum carries impulses to a second writing point. Induced currents from the two magnets are carried to a third and to a fourth writing point respectively. Perforations of the paper by means of the Metfessel tuning-fork timer complete the record. The magnets are activated by means of an electric flasher. Ten pounds' pull may be exerted to the right and to the left in a pattern set by the flasher. The subject is instructed to react as quickly as possible and to attempt always to keep his writing point on the center line of the paper. The moment the right magnet is activated, an induced current causes a record to be made on the paper. The curve drawn by the writing point in the hand of the subject reveals the reaction time of the subject to the load he is carrying, since it can always be plotted against the second-pendulum and the one-fiftieth second record of the tuning fork. One trial consists of a pattern of ten impulses to the magnets over an interval of twenty seconds.

The results on Varsity wrestlers show exact correlations between defensive skill and reaction time. Studies are now being made on other athletes and upon non-athletic subjects.

COLEMAN R. GRIFFITH. *Experimental Studies on the Function of Plateaus in Learning.*

Only a few of the studies in the field of learning have drawn a sharp distinction between the *form* of a skill, that is, the pattern of muscular movement that is to be perfected, and the *rate* at which this particular pattern of movement or 'movement system' is to be executed. Where 'rate-at-which' has been considered at all, experimenters have asked their subjects to learn to perform a given task at a maximal speed and they have assumed that the speed finally attained may be represented by that unique kind of plateau commonly called the 'practical limit.' Either the 'practical limit' or some judgment about the 'form' of the skill attained is then taken as the criterion of learning.

In certain types of athletic skill, however, a sharp distinction must be drawn between the form or pattern of the skill and the rate at which the skill is to be exercised. In distance running, in punting, and the like, there is one standard of excellence for the form of a movement and another for the rate at which the movement must be exercised. This rate may not be a maximal rate. As often as not, it is an optimal rate.

By means of a modification of the Carr slot maze, this phase of habit was put under experimental control. As had been anticipated, two factors of habit or skill revealed themselves, viz. the time, the pace, the 'rate-at-which' of the skill, and the form, the pattern, or the mode, of muscular efficiency. The investigation showed that pace or 'rate-at-which' could be described in a learning curve distinct from that for form or pattern. The unique relationship that holds between the pace and the pattern of a skill suggests that many cases of 'practical limit' and many alleged 'plateaus' in learning are due to the early and fortuitous acquisition of a pace habit which is established while attention is directed upon the form of the skill. Our experiments show that the rate of learning of the form of a skill may be modified by interference from these fortuitous pace habits and that such plateaus in learning will persist until such a time as it may take for the learner to break up an old pace and acquire a new one.

In certain kinds of skill, however, it is not advisable to try to break such a plateau since the excellence of the skill is judged, not by absolute speed, but by absolute form or stance at an optimal, rather than a maximal, speed. In this respect, then, plateau comes to have a new meaning and significance for certain kinds of athletic skill.

Coleman R. Griffith and S. M. Corey. *Relation between Exercise, Learning, and Resistance to Disease.*

It has long been rumored that athletes suffer in their scholastic work because of a direct influence of fatigue products upon the rate of learning. It is also rumored that athletes are very sensitive to certain pulmonary diseases. Scholastic averages, intelligence tests and ordinary vital statistics have not proven adequate to the solution of this problem and an appeal has been made, therefore, to the white rat.

An elevated maze which has been standardized for this and a related series of researches sets the learning problem. Exercise is provided in several different ways. The control subjects live in a large cage and take as much exercise as they desire. A group of sedentary rats live in a confined space where a minimal amount of exercise is possible. Various degrees of exercise, running from moderate to exhaustive, are provided by a motor-driven rotating nest in which the subjects are forced to run for variable periods of time. Each subject is weighed every day and these weights are correlated with amount of exercise and with rate of learning. Learning is judged in terms of several criteria, viz. number of errors, total time spent on maze, time spent in actual movement on maze, and time of relearning after an interval of two weeks.

Since heavy exercise involves the factor of hunger, one of the first sub-problems has been the relation between hunger and rate of learning. It appears that hunger as an incentive in learning must take on more importance than a large number of studies have been willing to grant. In the hunger groups each animal is fed a sufficient amount of food each day to equal the loss of weight from the preceding day. Under these conditions animals in the control group make slightly less than twice as many errors per trial as the control group. This ratio holds approximately for total time spent on the maze as well as for running time.

This study is now continuing with the other experimental and control groups it demands. The purpose of the experiment is to push to the limit the concept of exercise in its relation to learning, both exercise in its own right and exercise alternating with periods of complete cessation of exercise. All of the subjects in this experiment are being used in a further piece of research on the relation between exercise and resistance to disease. Cultures are now being standardized for some of the common pulmonary infections to which athletes are said to be sensitive. As each group of animals passes the phase of the experiments described above, they are inoculated with the prepared cultures. It is still too early to predict the probable results of these experiments; but adequate data will be at hand in six or eight weeks.

S. GROSSMAN, see E. B. SKAGGS.

A. A. GRÜNBAUM. *Beitrag zur Revision der Apraxiefrage.*

Die klassische Apraxielehre beruht auf folgenden psychologischen Voraussetzungen: (1) das Handeln geschieht auf Grund der aufeinanderfolgenden Kognitionen: Objekts-, Ziel-, Bewegungsvorstellungen; (2) die Störungen auf Grund der mangelnden Verbindung zwischen Vorstellungen und reinen Bewegungsmechanismen. Diesen prinzipiellen Grundlagen gegenüber wird die Lehre entwickelt, dass es keine selbständigen Objektsvorstellungen gibt und dass diese durch die Antizipation der Handlung und zwar nur bei ihrer Hemmung entstehen.

Dementsprechend findet man in pathologischen Fällen die direkte Abhängigkeit der gestörten Gnosie von den Defekten der Psychomotorik elementären und funktionellen Ursprungs. Es ist eine Reihe von funktionellen Umwandlungen der Motorik studiert, wie z. B., Trennung des Aktionsraumes in zwei nicht kommunizierende Gebiete der rechten und der linken Hand, Regression des dreidimensionalen Aktionsraumes zu einer einzelnen momentanen Richtung, Verlust der Selbständigkeit (vorall von rechts und links) der Einzelbewegungen und ihrer Feinheit, die alle zu motorisch-apraktischen Störungen führen. Regelmässig wird dabei beobachtet, dass, falls die Handlung stark an optisches Wahrnehmungsfeld gebunden ist, Patient auch agnostisch wird. Hier wird also die Störung der Handlung nicht durch

Unterbrechung des Weges von den erhaltenen Vorstellungen zu den Bewegungsmechanismen verursacht, sondern durch funktionale Umwandlung der Motorik, die gerade auf die Vorstellungen einwirkt und sie amorphisiert.

Was die ideatorische Apraxie betrifft, so wurde diese in bestimmten scheinbar normalen Fällen entweder durch stärkere Differenzierung des zur Handlung zugehörigen Wahrnehmungsfeldes oder durch Komplikation des Handlungsentwurfes provoziert. Es konnte durch Umkehrung der Reihenfolge derselben Aufträge gezeigt werden, dass von zwei aufeinanderfolgenden Handlungen mit je einem Objektspaar immer die zweite ideatorisch apraktisch wird, wobei die Störung nicht auf Störung der Vorstellungen, sondern auf Fehler der eigentlichen motorischen Ablaufes (seine Perseveration) beruht, wodurch die Erkenntnis des zweiten Objektspaares verhindert wird.

In Fällen der konstruktiven Apraxie kann man ebenso zeigen, dass die Störungen einerseits in der optischen Unterscheidung der Sehrichtungen, anderseits in der impulsiven Intention um die Bewegungen richtungsgemäss zu dirigieren, simultan auftritt. Hier im Gebiete des " Raumsinns " ist der gnostische und praktische Anteil einer Handlung primär nicht auseinanderzuhalten und die Regression besteht öfters gerade darin, dass die Gnosie und Praxie an einander stark gekoppelt sind.

Die primitive Funktionseinheit zwischen Gnosie und Praxie tritt besonders hervor in den kaum beachteten Moment, der den Parapraxien öfters die Richtung gibt und der als zwangsmässiger "Aufforderungscharakter der Gegenstände" gennant werden soll: Stock und Ring z. B. als Elemente eines optischen Feldes, Kolben und Zilinder als unselbständige Teile einer mechanischen Einheit, fordern primär die Ausführung einer ganz bestimmten Bewegung: Stock wird in den Ring hineingeschoben, Kolben wird im Zilinder hin und her geschoben oder darin herumgedreht. Man kann diese zwangsmässige Direktion der Motorik durch Aufforderungscharaktere in den motorischen Spielen der Kinder, in den Manipulationen der Anthropoiden mit

zufälligen Objekten, in den Entleisungen der Patienten mit motorischer, ideatorischer oder konstruktiver Apraxie beobachten.

Was in letzteren Fällen stattfindet, ist somit die Regression der Handlungsmechanismen auf die Stufe, auf der die zwangsmässigen Impulse auf Grund der Aufforderungscharaktere nicht durch später erworbene Antizipationen der zweckgemässen Handlungen gehemmt werden.

Dies ist eine strenge Analogie zu den Abbauerscheinungen der neuromotorischen Mechanismen, in welchen die primitiveren physiologischen und biologischen Bewegungstypen in Erscheinung treten auf Grund der Enthemmung und Regulationsverfall seitens höherer Schichten des Zentralnervensystems.

A. A. Grünbaum, see also L. Bouman.

J. P. Guilford. *Some New Laboratory and Teaching Devices.*

The chromopathometer. The chromopathometer is an instrument for measuring the affective value of colored lights which are produced by commercial dipped bulbs. The lights are projected in a diffused form upon a ground glass screen and are seen by the observers as circular patches. Five colors, red, green, yellow, blue and white, may be presented in pairs, or in pairs of combinations of two, for judgments according to the method of paired comparisons. The lights have been equated for intensity by the flicker method, so that the judgments may be based upon hue alone. From one to a hundred subjects may be used at the same time.

The device can be adapted to the study of color-vision and of color-preferences, if there are any, in lower animals. It can also be used for measuring the attention value of hues and the reaction-times to different hues, and for various other experimental problems.

A model for demonstration of facial expressions. This model is similar to the Boring-Titchener device but it presents the full-face view. It permits the addition of many new expressions not possible on the older model. There are three new types of eyes, two more noses, and two more mouths.

A stamp pad for studying tactual localization. This stamp-pad provides a ruled surface 4 x 8 cm. divided and subdivided into 5 mm. squares. It facilitates the localization of the stimulus and of the subject's judgments and makes possible a more accurate and measurable record.

RALPH H. GUNDLACH. *The Dependence of Tonal Attributes upon Phase.*

Although there is general agreement that sound localization is physically dependent upon differences in intensity, phase, and time of arrival at the two ears, our knowledge as to the experiential basis for such localization has been limited by our uncertainty concerning the tonal attributes. In this study an attempt was made to determine the attributive changes dependent upon changes in phase for the frequencies 100, 400, and 1,000 d.v.

Ten subjects were first practiced in describing in terms of pitch, intensity, volume, and brightness, tones produced by variators and by a modification of Abraham's siren disc. There were 700 to 900 reports on each aspect of the tones. The sounds for the major series were produced by an audio-frequency oscillator. Phase was changed by varying the distances from the Baldwin phones to the subject's ears. Quantitative and qualitative reports were made. The quantitative results are based upon about 1,600 reports for volume, and about 1,000 reports for each of the other attributes for each of the ten subjects.

Attributive changes with changes in phase are in most cases negligible. With the exception of brightness there is no consistent change of any attribute with change of phase. In general, brightness decreases with an increase in phase difference. This decrease is directly proportional to the difference in the lengths of the transmitting tubes regardless of the wave-length of the tone. Hence localizations previously ascribed to phase-differences are apparently due rather to absolute time-differences. The erratic reports on intensity and pitch were found to be due to differences in tuning of the observer's ears. The reports on volume were most unsatisfactory. There was such disturbance from the other aspects, especially brightness, that even the limens for volume were affected.

The qualitative reports aimed at distinguishing the attributes, and at checking the quantitative reports. Pitch was described as that aspect which varies up and down; volume was described as an aspect of the boundaries, or perhaps of the filling; brightness, as the filling, or the clearness of emergence; intensity, as the force or strength of the tone. Six of the ten observers reported that volume and brightness are reciprocal. Reports on localization appear to be much easier and more consistent than reports on any attributive change. The tones appeared to shift from one side to the other, or to be in one ear, or in the other. Auditory localization seems to be a primary fact. These findings bear directly upon certain aspects of intensity theories of hearing.

ALFRED GUTTMANN. *Ist die Vierteltonsmusik möglich?*

Der Geist unserer Zeit, die auf allen Gebieten der Geistes- und Naturwissenschaften grundlegende Umwälzungen aufweist, spiegelt sich auch in den Künsten wieder. Dichtkunst, bildende Kunst, Baukunst und Literatur zeigen dies deutlicher noch als die Musik, die, als jüngste aller Künste, in ihrem Entwicklungslauf erst durch wenige Jahrhunderte zu erkennen und zu definieren ist. Die Musiker versuchen, von dem durch drei Jahrhunderte überlieferten Tonmaterial und Harmonievorstellungen loszukommen. Das Aufgeben der Tonalität, das Nebeneinandersetzen von Tonarten, die bisher beziehungslos zu sein schienen, ist der eine Weg. Der andere: unsere bisherigen Tonschritte aufzugeben und durch Einführung von kleineren Intervallen als es der temperierte Halbton ist, neue Klangwahrnehmungen und damit neue klangliche Erlebnisse zu vermitteln. Als einer der ersten, der hier neue Wege versuchte, kann Busoni genannt werden, der allerdings mehr durch gedankliche Ueberlegungen und summarische Versuche, als durch praktische Komposition oder systematisches Experimentieren zu seinen Folgerungen kam. Zielbewusst hat erst Haba die Vierteltonsmusik theoretisch begründet und zugleich durch praktische Kompositionsversuche zu beweisen sich bemüht.

Es erhebt sich die Frage, ob es möglich ist, durch messende Untersuchungen folgende zwei Voraussetzungen nachzuprüfen, die theoretisch von den Vertretern der Vierteltonsmusik aufgestellt sind: (1) Ist unser Ohr imstande, Vierteltöne als solche zu erkennen (und auf irgend ein harmonisches System zu beziehen)? (2) Sind die Musikinstrumente ohne feste Tonstufen und die menschliche Stimme imstande, Vierteltonschritte zu produzieren? Beide Fragen mussten durch Experimente einwandfrei geklärt wenden. Die erste Frage ist bereits vor 25 Jahren von Karl Schaefer und mir verantwortet worden. Wir haben durch ausführliche Versuche, zu denen wir als Versuchspersonen die ersten Fachleute der Akustik (z. B. Geheimrat Stumpf und Hornbostel), sowie zahlreiche Musiker herangezogen haben, festgestellt, dass unser Ohr trotz seiner ungeheuren Empfindlichkeit für *nacheinander* dargebotene Töne, ausserordentlich unempfindlich für zwei *gleichzeitig* dargebotene Töne von geringem Unterschied der Schwingungszahl ist. Kurz ausgedrückt: nur in einer kleinen Region können wir zwei gleichzeitige Töne, die um einen halben Ton differieren, mit Sicherheit als zwei Töne von bestimmter Tonhöhe identifizieren. In dem weitaus grössten Bereich der musikalisch verwendeten Töne hingegen können selbst weiter auseinanderliegende Töne nicht mehr als zwei Ton-Individuen erkannt werden, sondern erscheinen nur als eine Unreinheit. In der tiefsten Lage des musikalischen Bereichs werden sogar auch Intervalle wie der Tritonus nicht anders erkannt als an der "Unreinheit." Den zweiten Teil des Problems habe ich durch messende Untersuchungen kinematographischer Art in Angriff genommen. Es zeigte sich durch viele hunderte von Experimenten, dass weder der geübteste Sänger, noch die ersten Virtuosen (Geige, Violoncell, Oboe, Horn, Posaune) imstande sind, auch nur annähernd ein Intervall von der Grösse des Vierteltons zu treffen. Genauer gesagt: selbst ein Halbton-Intervall zu treffen ist eine ausserordentlich schwierige Aufgabe, insofern, als auch der geübteste Musiker dauernd um diese erstrebte Tonhöhe herumschwankt und nach oben wie nach unten um mehr als einen Viertelton abweicht.

Somit ergab sich, dass weder unser Ohr, noch die menschliche Stimme, noch unsere Instrumente imstande sind, eine Vierteltonsmusik zu hören oder auszuführen. Ein Musizieren in Vierteltönen ist also undenkbar und beruht auf Selbsttäuschung—sofern es nicht auf eine bewusste Täuschung hinausläuft. Daraus kann man die tröstliche Gewissheit schöpfen, dass die Musik von Palestrina an bis auf die Neuzeit nicht in Gefahr steht, durch die Vierteltonsmusik aus allen Kulturkreisen verdrängt zu werden.

M. E. HAGGERTY. *American Psychology and Instructional Problems.*

From its beginning the new psychology in America has been closely identified with the problems of education. This discussion deals with literature that has appeared in journals and monographs since 1887, the date of the founding of the *American Journal of Psychology,* " to record psychological work of a scientific as distinct from a speculative character." Within the first decade about seventy-five psychological articles relating to instruction appeared in psychological and educational journals.

Search for material has led to an exhaustive examination of the complete files of twenty psychological and ten educational periodicals which have begun publication during the forty-year period. Most of these are still current. The survey reveals 3,364 articles, totalling 70,358 pages, written by 2,585 authors. The psychological journals furnish 1,336 articles, totalling 39,162 pages, by 1,052 authors. For the educational journals the figures are 2,028 articles, 31,196 pages, and 1,533 authors.

The writer has undertaken to abstract all the articles indicated, to identify the problems studied, to classify them into general groupings, to summarize the findings, and to interpret the whole into certain general trends of thinking and practice. In making abstracts a printed outline comprising about 200 separate items has been used, a method tending to squeeze all the facts from each article and to arrange them for tabular integration.

This body of literature reflects a distinct reversal of attitude in thinking about educational matters from the prevailing tendencies of the early eighties. The method of theoretical speculation was sharply challenged by the direct and experimental study of concrete human nature and has suffered increasing limitation as the experimental method has been supplemented by the use of mathematical formulae in research.

The problems studied and the facts revealed may be grouped about four main centers of interest: (1) the genesis of mind, (2) factors in learning, (3) individual difference, and (4) techniques of measurement. Measured by number of authors, number of articles, and number of pages, the problems of learning are of first importance, including more than half the totals listed above. The psychology of development stands second, the techniques of measurement third, and individual differences fourth.

The investigation, when completed, will reveal the detailed topics of study, the trends by half decades, the contribution of individual periodicals and authors, and an evaluation of the total contribution of the new psychology to education.

M. E. HAGGERTY. *A Technique for Content Selection for Courses in Psychology.*

The Directory of the United States Bureau of Education for 1929 lists 898 colleges and normal schools. The number of junior colleges is 382, making a total of 1,280 institutions of higher learning in America. Psychology in some form is taught in most of these institutions. There are, in addition, about 2,800 professional colleges and secondary schools, some of which teach psychology.

Only to a limited extent is this teaching done by persons connected with the American Psychological Association. This organization enrolls 893 members and associates. Only 448 of these are in teaching institutions. Even among the 184 colleges and universities where these teachers work, instruction in psychology varies greatly both as to content and method. When other institutions are included, the variation is clearly excessive.

Any discussion of desirable course content in psychology, as, for example, the content of a beginning course, or the content of educational psychology, quickly reveals the need for some technique to objectify such content and to make possible the formulation of a consensus of judgment, which, in the present stage of educational theory and practice, is a chief means for determining satisfactory curricular content. It was with the intent of providing one such technique for curricular investigation that the writer undertook to arrange a comprehensive check list of items in psychology.

The 2,584 items in the list were derived from an examination of 51 books or journals designed for college use. The classification headings employed by *Psychological Abstracts* are used in the arrangement, which is columnar, with spaces at the right for checking purposes, and with a numbering system to facilitate tabulation.

While the list was originally devised as a technique for curriculum studies, it has other uses. More than fifty types of problems have been suggested in which it may be employed. The following outline grouping may be regarded as suggestive. The list may be used:

1. To make (a) objective record of course content, (b) analysis of texts, and (c) consensus of judgment.
2. To aid in formulating curricula and unifying instruction.
3. To assist in determining examinations.
4. As a means of (a) directing experimental investigation, (b) describing psychological theory, (c) identifying relationship of psychology with other sciences, and (d) objectifying trends in productive work.
5. In instruction (a) as a teaching syllabus, (b) as a basis for bibliographical reference, and (c) as a device to indicate limits of assignments.
6. In evaluating instruction by securing competent judgments.

THOMAS H. HAINES. *The Psychology of Violence in Punishment.*

The primitive reaction to a force causing pain is an attempt to stop its action. The death wish is such a primitive reaction to pain or deprivation. A patient's migraine connects up with a birth injury by forceps through a dream expressing a death wish for the obstetrician.

Restraint of excited patients only makes them more excited and ill. May it not be that violence used upon criminals causes the same reaction in them,—makes them more violent?

Psychiatry shows that, in young persons, nervousness and a-social behavior proceed alike from inadequacies of adjustment. Delinquencies are the outcome of kinks and twists in personality development. Constructive criminology approaches each individual with a mind open to ascertain his individual needs and to supply these needs. It seeks to understand him and to get him to understand his need of understanding himself.

Restraint does fill an experienced need in the offender's life as punishment meets a want in the child's life. Loyalty to the firm parent is the means of bringing self-control to realization in the child. The restraint of the institution enables the offender to get an experience of his more ideal self and to integrate himself upon a higher level.

H. M. HALVERSON. *An Experimental Study of Prehension in Infants.*

This study is a frame-by-frame analysis of the cinema records of infant prehension. The subjects of investigation are twelve or more infants at each of the following ages: sixteen, twenty, twenty-four, twenty-eight, thirty-two, thirty-six, forty, and fifty-two weeks.

The infant is seated before a table and given opportunity to prehend a one-inch cube, placed before him six inches away. If, at the end of ten seconds, the cube is not grasped, it is advanced three inches toward the infant and another ten seconds allowed for its prehension. This procedure is repeated with a second and a third cube, after the cubes previously presented have been placed in the infant's hands.

The record of the infant's behavior is secured by a motion-picture camera, incased in a near sound-proof box, aimed at the infant from an angle of 50° from horizontal in the front median plane. Supplementary photographic records by a camera at right angles with the first camera are obtained.

The data show that prehension consists of approach followed by grasp. Three forms of approach are found: (1) the circuitous (scythe-like), (2) the backhand, and (3) the straight. The first predominates in infants up to thirty-two weeks of age and the last in older infants. The backhand approach fairly common in younger infants becomes a straight approach for infants above twenty-eight weeks. The approach itself permits of analysis into four phases: (1) initial adjustment to cube, (2) initial approach, (3) alignment, and (4) culminating approach. Seven definite forms of grasping fairly consistent with the various age levels appear in the following order: pincer, thumb-down palmar, thumb-in palmar, superior palmar, inferior forefinger, normal forefinger, and superior forefinger. Quantitative evaluation of the data gives, within one-sixteenth second, the response-time for grasping, for actual time of grasp, for duration of visual attention, for duration of retention of cube, and for associated features of pattern.

Rose S. Hardwick. *Minor Handicaps in the Early Years as a Causative Factor in Delinquency.*

A child entering school is passing through a crisis in social adjustment. Handicaps, so slight as easily to escape recognition, and for which singly he could compensate, when combined may baffle his efforts at adjustment and thus early divert him towards vagabondage an doutlawry. Major handicaps are quickly recognized and often remove the sufferer automatically to a specialized environment. The children in question, however, must live their lives in the open community unless institutionalized as the result of delinquency. Boys eight and nine years old, of normal intelligence and potentially good personalities, are now coming to the clinics charged with running away, insubordination, stealing, and the like, apparently as the result of some combination of minor handicaps.

In the interest of crime prevention as well as general social betterment, it is urged that more attention be concentrated on securing the detection, in the pre-school period, of minor handicaps and the prompt, intensive study of those individuals who fail to adjust normally to school life.

GEORGE W. HARTMAN. *Determination of Easy and Difficult Number Combinations by Immediate Auditory Memory.*

To answer the general question whether any one two-place number is easier to learn or remember than another, required allotting by chance the first hundred numbers to four series of 25 each. Each series was preceded and followed by three numbers designed to neutralize primacy and recency effects.

Each series was read by the experimenter to psychology classes, totalling 234 students, who were instructed to write immediately on prepared cards all the numbers they could recall, disregarding the original order of presentation. Half the students heard the series in the order, I, II, III, IV; practice effects (though slight) were equalized by giving the other half the series in this order: IV, III, II, I.

If 27 appeared in a presentation and was noticed by 41 out of 100 subjects, its frequency of correct response was 41 per cent. A percentage record was computed for every number from 1 to 99.

Application of the Spearman-Brown reliability formula yielded a self-correlation of 0.81.

Results. (1) The average recall value of all 99 numbers is approximately 38 per cent.

(2) The recall value of the numbers 1 to 9 is very high, the average frequency of correct response being 71 per cent. This is probably attributable to the contrast afforded by these simple digits in a body of two-place numbers. The other average values by tens are: Numbers 10–19, 51 per cent; 20–29, 36 per cent; 30–39, 35 per cent; 40–49, 29 per cent; 50–59, 31 per cent; 60–69, 33 per cent; 70–79, 27 per cent; 80–89, 32 per cent; 90–99, 39 per cent.

(3) Double numbers, such as 22, 33, etc., are apparently easy to recall, the average correct response being 44 per cent.

(4) Contrary to expectation, numbers whose digits are in natural sequence (*e.g.* 23, 34 . . . 89) give an average recall value of 33 per cent, somewhat lower than the general average.

(5) Numbers ending in 5 have an average value of 34 per cent; numbers ending in 0, one of 36 per cent; both are slightly inferior to the general average.

(6) The order of numbers, from easiest to most difficult, is as follows: 1, 2, 5, 4, 9, 3, 8, 11, 61, 6, 10, 12, 19, 21, 16, 50, 7, 99, 22, 17, 23, 98, 33, 88, 13, 14, 90, 18, 56, 87, 97, 77, 96, 27, 55, 65, 79, 31, 91, 35, 36, 64, 66, 80, 15, 45, 86, 39, 44, 25, 37, 40, 54, 81, 20, 42, 47, 63, 32, 94, 38, 70, 72, 57, 73, 92, 95, 30, 49, 78, 85, 93, 41, 60, 62, 67, 76, 29, 75, 34, 46, 59, 84, 89, 24, 82, 26, 28, 48, 51, 53, 69, 52, 83, 43, 58, 71, 74, 68.

HUGH HARTSHORNE. *Objective Evidence of the Integration of Character.*

Children of grades 5 to 8 show little evidence of either consistency among different types of ethical conduct or between ethical conduct and comprehension of the ethical implications of conduct. The average intercorrelation of individual performance in a long series of situations involving kindness, coöperation, honesty, and self-control is about zero. The correlation between the sum of the same series of performance tests and the sum of a long series of measures of knowledge, opinion, and attitude is about 0.16.

There is considerable variation among children with regard to the amount of consistency they show. Taking each child's standard deviation of his own scores about his own mean score as a measure of his consistency, we find a mean standard deviation of 0.8. Complete consistency would require a mean standard deviation of 0, and a chance alone would yield a mean standard deviation of 1, *i.e.* the consistency shown is only slightly better on the average than chance would provide.

The more consistent individuals have better reputation for character as a whole, have higher scores on performance tests and on tests of knowledge, opinion and attitude, get better school grades, are less neurotic and suggestible, and are slightly more intelligent than those who are less consistent. There is no correlation between consistency and age in the population tested (grades 5 to 8).

As between the very consistent and very inconsistent children, no other general differences were found in a population of 100 grade-children save in socio-economic level and in religious background. Only 25 per cent of the 20 least consistent reached or exceeded the median socio-economic level of the 27 most consistent. Whereas all but four of the latter group came from Protestant homes, only half of the former group had Protestant upbringing. For five of the least consistent group no religious affiliation was known; four were Catholic or Catholic and Protestant, and one was Jewish. In the other group there was one Catholic, and three families had no religious affiliation. About half of each group were members of religious or semi-religious organizations teaching ethics. The girls were in slightly larger proportion in the consistent group than in the inconsistent group—52 per cent as against 40 per cent.

Children in an environment favoring honest performance become more consistently honest as they get older, whereas in an environment favoring dishonest performance the children become more consistently dishonest as they get older.

HUGH HARTSHORNE. *Sources of Anti-Social Behavior as Revealed by Objective Character Measurements.*

The Character Education Inquiry (May and Hartshorne) secured records of the performance of several hundred school children in grades 5 to 8 in 37 objective life-situation tests. These were correlated with 30 measures of social information and attitude, home background, *etc.*, with such results as the following.

Deception, selfishness, and lack of self-control are highly specific. The most anti-social school children show less consistency than the most pro-social children. The same community may favor relatively poor performance in unselfish acts and excellent performance in honest acts. On the whole, children in an ill favored city community tend to grow more anti-social, whereas the reverse is true of children in a small, stable community. In grades 5 to 8, lack of character is unassociated with age, slightly associated with lower intelligence and with emotional instability, still more closely associated with dishonesty, selfishness, and the absence of self-control, still more closely with social ignorance and anti-social attitudes, and most closely of all with bad reputation. One of the most powerful influences for good or evil is the friendly or unfriendly atmosphere of the class-room. Loss of class-room morale is accompanied by a general increase of anti-social performance.

S. R. HATHAWAY. *A Photographic Study of Postures Maintained for Long Periods During Sleep.*

S. R. HATHAWAY. *A New Apparatus for the Measurement of the Galvanic Response.*

This apparatus for the measurement of the galvanic response uses the three-element vacuum tube as a medium of detection and amplification, and an alternating potential as extrinsic current supply. It is demonstrated that responses can be obtained with dry electrodes without polarization. Readings of the responses are made on a milliammeter scale. The apparatus is simple in operation and is portable.

This set-up has been used in connection with an association list on 100 college women. Records were kept of associative reaction-time and galvanometric values. Part of the words were given in the forenoon and part in the afternoon.

A correlation of $\rho = 0.60$ was obtained between average reaction-time and average galvanic response. A reliable indication is obtained that the galvanic responses are larger in the morning and that the reaction-times for words are shorter in the morning. The words were given during an epidemic of stealing in the dormitory in which the women stayed. Approximately half of the words were associated with this stealing. The average galvanometric ratings for these words is 4.26 per cent less than the average reaction-time for the same words. This is taken as definite indication that the galvanic response is the more diagnostic of the two measures.

William Healy. *What Is Maladjustment?*

It has come to be a part of professional jargon in psychological and psychiatric circles to speak of adjustment or maladjustment in a general and abstract way. *Adjust* is a transitive verb; hence, to complete the sense or meaning of any phrase, the term *to adjust* requires specification of an object or a relation. What is adjusted must be adjusted to something, or maladjusted to some particular object or situation.

In the study of actual life situations one finds that the human individual may appear badly adjusted to a given social group but very well adjusted to his own inner needs or desires or ideals. On the contrary, one may be extremely well adjusted to a group situation, as in the cases of delinquency and criminality. For example, some delinquents are poorly adjusted to the social requirements of the law, but their deeds are actuated in close adjustment to their own inner needs or desires and may also be well adjusted to a group situation as related to a crowd or gang situation. The young boy who has not spoken for two years is an extreme case of maladjustment to society, but he is living in close adaptation to certain internal wishes.

Quite in contrast are the cases of highly successful and respected business men who come to psychiatrists with a story that even in their successes, and with all the social standing which they have achieved, they feel themselves to be utterly at outs with their own ego ideals.

Discussion of maladjustments must properly have at least two nodal points: (1) the problem of what, specifically, the individual is not adjusting to, what situations in the external world of men and things, or what special features of his own inner mental life; (2) the balancing of adjustments and maladjustments as related to the requirements of society and the requirements of the individual's own inner urges.

William Healy and Augusta Bronner. *Reciprocal Relationships between Mental Capacity and Other Aspects of the Total Personality.*

From our studies of personality, educational, and conduct problems, we have accumulated much evidence of the existence and the modes of active interplay between psychometrically ascertained mental capacities and other factors that go to make up the total personality. These findings have theoretical interest, but also they are vital for practical interpretations that are basic in attempting therapeutic adjustments.

Not all such interrelationships can here be discussed, and indeed they are probably not all known. We are, undoubtedly, only in the very beginnings of understanding of what goes to make up the various elements of personality, and our knowledge and techniques of mental measurement are as yet only in their infancy. But some outstanding factual material is now available that throws great light upon the development of personality and of careers. These facts are all too little taken into account by writers on personality and character; their interpretations generally leave out the factor of mental capacities. On the other hand, the psychologist, in estimating the individual in terms of mental measurements, very frequently fails to recognize the extent to which capacities may or may not function as influenced by other constituents of the total personality. Not only the so-called emergent personality but also the theoretical engrams or neurograms inevitably must be formed to some extent by the nature of the plastic material of the nervous system, in terms of its capacities, and by the nature of the experience which plays upon it, which, in turn, is delimited and selected according to the individual's capacities. Besides this, there is the whole question of mental energy which is quite ascertainable, in studies of individuals, to be something quite apart from 'mental capacities.'

Illustrative material could begin with the problems of body-build and of some endocrine functions as related to mental capacities and mental output, but these are already recognized. Much less well known are the relationships between unused abilities, general or special, or so-called talents, and personality conflicts, dissatisfactions, or satisfactions. Learning ability, demonstrable by certain tests, frequently shows poor correlation with ratings given by 'general intelligence' or age-level tests, and the discrepancy makes for the development of certain traits of personality. Likewise, special apperceptive abilities have a peculiar relationship to personality development and conduct-careers. Factors, other than mental capacities, which sometimes enable defective individuals to succeed well, or which prevent those of superior ability from satisfactory achievement, are to be found in other instances.

To determine what these variables are and what their interplay is becomes the task of a well rounded study of the human individual.

EDNA HEIDBREDER. *Temperament and Accomplishment.*

The relationships between temperament and accomplishment are considered from the standpoint of the results of several experimental studies. The term *temperament* is used to refer to such reactions as moods, interests, and personality traits; *accomplishment,* to denote success in scholastic, artistic, commercial, industrial, and social activities.

CHRISTIAN PAUL HEINLEIN. *The Relation of Intensity to Extensity and Protensity in the Perception of Musical Configuration.*

According to the fundamentals of psychology, the three primary tonal attributes of auditory sensation are (1) extensity, (2) intensity, and (3) protensity. Sensorially considered, these attributes are coexistent; auditory sensation is the end-product of the simultaneous co-function of all three attributes. Thus every sensation of pitch is characterized by some specific loudness and some specific duration.

Physically considered, it is possible to vary frequency and maintain a constant amplitude. However, psychologically considered, the ratio between extensity and intensity is not constant. Despite constant tonal amplitude, this feature of variable relationship between extensity and intensity as psychological phenomena, gives rise to the experience of increased loudness in a progression towards the upper limit of the extensity series. As the upper limit of the extensity series is finally approached, the reciprocal condition of diminishing effects is produced. The experience of increase in loudness with rise in pitch is enhanced by progressively diminishing temporal intervals. Assuming a constant tonal amplitude, the converse experience of decrease in loudness with a drop in pitch is enhanced by progressively increasing temporal intervals. In the perception of musical configuration, melodic or chromatic ascension with temporal acceleration frequently produces the experience of heightened tonal intensity.

Christian Paul Heinlein. *The Effect of the Musical Modes on Amplitude of Tapping and on the Nature of Pianoforte Performance.*

Given for consecutive sight-reading rendition the major and minor transcriptions of an unfamiliar musical composition, consisting of a melodic-harmonic figure of two four-measure phrases in common time, conservatory trained pianists possessing a high degree of musical scholarship and proficiency in keyboard technique adopt a slower tempo in performing the minor transcription. There is a marked tendency to interpret the major transcription in staccato style, the minor transcription in legato style. Pedal depression frequency and pedal pattern as related to melodic incidence are only slightly altered by a change in modal structure. For a given modal structure, some subjects effect an increase in damper-pedal depression frequency, while other subjects effect a decrease. There is a general tendency to play the major composition loudly, the minor composition softly. Introspections reveal that the minor structure is interpreted to signify sadness and longing, the major structure joy and flippancy.

In listening to the same transcriptions played consecutively in the same tempo on the Duo-Art reproducing piano, the same pianists failed to give evidence of any marked muscular relaxation during rendition of the minor composition or marked muscular excitation during rendition of the major composition. There is no constant variation in amplitude of tapping when tapping is either coincident with the basal rhythmic pattern or with the pitch points of the melodic contour. In only scattered instances does the pattern of tapping amplitude correspond to the pattern of melodic inflection. A melodic descent to the minor *third* produces an increase in amplitude as frequently as a decrease.

S. Hellerstein. *The Problem of the Training of the Intellectual Functions.*

In order to understand the specific features of training-curves of the intellectual functions it is necessary to consider the phenomenon of ' plateau.'

Analyzing experiments in reference to this problem, I have noticed that plateaus arise mostly in the learning-curves whenever the process of forming intellectual habits is accompanied by enduring delay. However, in some cases plateaus arise as a consequence of the necessity to consolidate and automatize the simple acts, which form afterwards a complex habit (*e.g.* in the processes of learning to read, write, shorthand, typewrite, *etc.*).

The structure of acquiring intellectual habits is more complicated. Our experiments show that in these cases plateaus characterize temporary hindrances, caused by the seeking of new methods of solving intellectual tasks. In these cases we have a right to suppose that the subject has the intention to substitute, for a less improved means of work, a more improved, that he somehow strives to re-equip himself intellectually. This process must attract especially the attention of psychologists (both theoretical and practical), because here we are in a close contact with the mechanism of forming intellectual habits.

In my experiments I have tried to construct some tests, the solution of which could be realized by different (not equivalent) psychological means. I intended to discover a method of investigation which would give me the possibility, not only of registering the quantitative increase due to training, but also the qualitative characteristics of the functional changes caused by training.

I adopted for this purpose a 'number series test' and the 'Friedrich test,' and constructed series of these tests which were made gradually more difficult and qualitatively different. In the course of three months I used 12 subjects, testing each separately with intervals of one, two, or three days.

In order to study more carefully the phenomenon of plateaus I tried to provoke in the subjects certain methods of intellectual work and this way artificially to build the plateau. After this I succeeded in destroying these plateaus by giving the subjects new instructions and encouraging them to use new forms of intellectual work.

The fact that with the aid of such a method it was possible to provoke an increase, where it would not be expected, seems to be a very important fact for educational and industrial psychology. This fact also indicates the existence of false or supposed limits of training. It proves also the probability of some specific mistakes in the prognosis of intellectual abilities, for such mistakes are caused by undervaluing the qualitative steps in the process of forming intellectual habits.

S. HELLERSTEIN. *About Prognosis in Psychotechnics.*

HARRY HELSON. *The Effects Obtained from Rotation of Irregularly Formed Regions.*

If a solid black line, rectangle, or region of any shape whatsoever be placed upon a white disc and rotated, circular bands of varying brightness will be seen. In asking trained psychologists what would be seen, I have found few able to give even a general description of what might be expected from an irregularly formed region, although several writers have considered the effects of rotation upon more or less regularly formed areas. If a straight black line be rotated on a white disc, only part of the line will be seen, the rest failing to appear. The question then becomes: given any closed curve, where will a change in brightness be seen? Our mathematical treatment consists in first obtaining a curve which expresses the proportion of black to the whole as a function of the distance from the center; that is, as we rotate the disc, various more or less homogeneous rings will be seen, and we obtain a curve which expresses the proportion of black to the whole in any particular ring as a function of its radius. This curve we call the geometric curve. Criteria are given which enable us to determine the characteristic features of the curve, *i.e.* where the critical points are and how the curve behaves near them, merely by inspection of the shape of the region. The geometric curve can be constructed accurately by determining a few critical points. Thus we can draw the curve for a rectangular region after knowing the points which correspond to its corners. The sensation curve is obtained from the geometric curve by an application of the Weber-Fechner law. This transformation gives a curve whose critical points occur at the same places and are of the same type as those of the geometric curve. Hence for purposes of interpretation the geometric curve is often sufficient.

H. HELSON, see also S. H. BARTLEY.

W. T. HERON. *The Effect of Frontal Destruction upon the Ability of the Rat to Retain the Stone Multiple-T Maze.*

A group of 55 rats of approximately the same age were run one trial per day for 20 days in the Stone multiple-T maze. These rats were given five trials, one per day, preliminary training in a simple-T maze in order to accustom them to the training situation.

On the basis of their error scores for 20 trials (trial series 1) in the multiple-T maze, they were divided into two groups of presumably equal ability. These two groups will be known as groups *A* and *B*. Group *A* was immediately operated upon and some of the frontal cortex was removed. After 20 days of rest, groups *A* and *B* were again run for 20 trials (trial series 2) in the multiple-T maze. Group *B* was then immediately operated upon and after another 20 days of no practice, groups *A* and *B* were again run 20 days (trial series 3) in the maze.

Under these conditions, the data show that while the difference between groups *A* and *B* for mean total errors in trial series 1 was insignificant, yet in trial series 2, group *A* made on the average eight times the errors of group *B*. The difference between the mean total errors for the two groups is 13 times its probable error.

Group *A* not only failed to retain what they had learned in trial series 1, but they made on the average 2½ times as many errors in trial series 2 as they made in trial series 1. The difference between their mean total errors for these two series of trials is eight times its probable error. On the other hand, group *B* made only one-fourth as many errors on their second series of trials as on the first.

In the third series of trials groups *A* and *B* are much closer together, although group *A* still makes more errors. The difference between the mean total errors for the two groups is only about two times its probable error.

On the basis of these and corroborating data it is argued that the destruction of the frontal cortex does interfere with the learning and retentive ability of the rat. It is further maintained that this is exactly what one should expect on the basis of any theory of brain functioning except one of specific localization unless it is maintained that the maze habit is localized in the frontal area. The failure to obtain interference with the learning or retention of a habit after cortical destruction is not *a priori* evidence for any non-specific localization theory of brain functioning, but may simply indicate that the problem set for the animal is too simple or too unreliable, the one of which is probably the corollary of the other.

PLEASANT R. HIGHTOWER. *Biblical Information in Relation to Character and Conduct.*

Since a review of the literature in character-study revealed that no attempt has been made to correlate biblical information and conduct (a positive relationship having been taken for granted), the problem of this study has been that of determining whether or not that relationship exists. Accordingly objective tests have been selected and devised. Tests of biblical information were prepared during the school year 1927–1928 and administered to 485 pupils. The results of this preliminary testing were used to determine the reliability of the test. The reliability was determined by correlating chance halves. For 100 cases selected at random, the r obtained was 0.850. By Brown's formula the reliability of the whole part is 0.919.

The validity of the tests was determined by an analysis of Sunday school literature and Bible readings for public schools, by pooled judgments of competent persons, and by item-by-item analysis.

These tests, along with various conduct tests, which presented eight opportunities for cheating, two for lying, two for showing loyalty, and two for showing altruism and service, were finally administered to 3,316 pupils, including pupils in delinquent schools, in grades seven to twelve in two middle-western states. The scores were treated statistically, and correlations, means, and the reliability of the means obtained.

The results obtained from the study show that the pupils with high scores and those with low scores on the tests of biblical information reacted similarly on the conduct tests, thus indicating that there is no relationship of any consequence between biblical information and the different phases of conduct studied.

Even though this position seems entirely defensible, it does not show in the least that the Bible or a knowledge of it is of no value in character building. It does indicate, however, very definitely that mere knowledge of itself is not sufficient to insure proper character attitudes.

HUDSON HOAGLAND. *The Weber-Fechner Law and the All-or-None Theory.*

Hecht has accounted quantitatively for the data of visual acuity and intensity-discrimination in vision on the assumption that intensity-thresholds for the rods and cones follow statistical distribution curves. On this basis he is able to show that the empirical ogive ('S') curve relating visual acuity to the logarithm of the light intensity is identical with the sum of the integral distribution curves for the rods and cones. The mid-region of the acuity ogive curve (on a semi-log plot) is approximately linear and it is over this range of intensities that the Weber-Fechner 'Law' appears to hold. The 'S' curve is at no point actually linear, and ranges of extremes of intensity, instead of representing breakdowns of the 'law,' as commonly supposed, are actually part of a meaningful function.

Crozier and Pincus, examining the geotropism of young rats of pure inbred strains, found a pseudo-linear relation between θ, the angle of orientation of the rats on the plane and the logarithm of the sine of α, the angle of the slope of the plane. Since sine α is the gravitational component in the plane, and since θ is a measure of excitation, this appears to be another instance of the Weber-Fechner 'Law.' However, Crozier and Pincus show that the relation is not linear but is a series of long drawn out 'S' curves. These curves are integral distribution curves for thresholds of tension receptors, and the differential curves are obtained showing how muscle receptors are brought into play by increasing the gravitational component. Here again the Weber-Fechner Law seems to be only a crude empirical approximation to the range covered by the integral distribution curves.

The writer finds that data of Adrian and Zotterman on myotatic reflexes relating frequency of afferent impulses as a function of the logarithm of the tension, for preparations containing numerous end-organs, give ogive curves, and that ogive curves are also obtained from their data relating frequency of afferent discharge and the logarithm of pressure applied to the toe pads of cats.

These various findings, by different methods, for different modalities, point to the conclusion that the logarithmic Weber-Fechner Law is generally an approximation for parts or sums of integral distribution curves relating thresholds of receptors to logarithms of stimulus. This principle would seem to account for much of the data usually subsumed under the Weber-Fechner Law.

M. T. Hollinshead. *The Vibrato in Violin Playing.*

Previous studies on the *vibrato* have been confined to the vibrato in the voice. The vocal *vibrato* is an inherent quality in the voice and may be found in very young and untrained voices. The instrumental *vibrato* is an artificial device, built in and conditioned in each performer.

For the present study Metfessel's procedure was purposely followed in order to make comparisons with latest vocal data. For eleven celebrated artists, 782 oscillations from widely differing types of composition were photographed according to the method of phonophotography which has been described and validated by Metfessel. Although tones were chosen at random, a *vibrato* was universally present.

The average rates and extents of the violin *vibratos,* with their probable errors, were computed and compared with the corresponding figures for vocal *vibratos.* A statistically significant difference in extent was discovered. The average extent of the violin *vibrato* is approximately 0.25 of a tone, while that of the vocal *vibrato* is half a tone. No significant difference between the rate of the violin and vocal *vibrato* was discovered.

Statistical techniques were also employed in measuring variability and individual differences between artists.

Theta C. Holmes and Leonard Carmichael. *An Experimental Study of Interrupted Partial Responses in Stylus-Maze Learning.*

The paper presents the results of a preliminary experimental investigation of the completeness of response as a determining factor in motor learning.

The blindfolded subjects of the experiment learned to run a specially designed narrow-alley stylus-maze. The stylus used was so constructed that it was at all times in contact with both sides of the alley.

The subjects were divided into two groups of fifteen each. In the experimental group the experimenter removed the hand of the subject whenever a blind alley was entered. The hand

and stylus were then placed once again at the entrance to the maze. The control group of subjects were allowed to back out of all blind alleys as in the usual maze technique.

The results indicate that the learning of the experimental group, *i.e.* the group with interrupted responses, was superior to that of the control group. The experimental group showed 87 per cent fewer errors, not including the errors occurring through retracing the true path. If these retracing errors are included, the experimental group was 103 per cent superior to the control group.

On retesting after two weeks, the experimental group still maintained an advantage over the control group although this advantage was not marked as in the original trials.

After learning the maze both groups of subjects drew the form of the maze from memory. The effect of the blind alleys was more completely eliminated in the case of the control group than in the case of the experimental group.

The results of this experiment show that, under the conditions given, the completeness of response as here defined is not a factor which determines learning.

Complete tables and graphs showing the results of the experiment are on file in the John Hay Library of Brown University.

J. Q. Holsopple. *A Dilemma in Clinical Psychology: 'Statistical' vs. 'Case' Studies.*

This communication is a statement of a serious and pressing problem in clinical psychology with a suggestion for its solution.

In spite of the thousands of maladjustments examined by clinical psychologists annually, in spite of the variety of factors considered in making appropriate recommendations, and in spite of the knowledge of the clinicians with respect to the outcome of the cases, little of this accumulated experience persists as an aid to future clinical work.

This failure of clinical psychology to profit by experience seems to be due in a large measure to indecision with respect to methods of compiling and using data. Clinical records may, after study, yield totals, distributions, and correlations. These findings, however useful they may be to the director of a large clinic in formulating general policies, are of slight value to the individual psychologist who must make a recommendation in a particular case. On the other hand, no set of case studies at present available to the clinical psychologist for reference during his apprenticeship offers even a reasonable hope of providing a case study which is sufficiently analogous to the problem with which he may be confronted at the moment.

One cannot expect a clinic whose main purpose is the practical solution of maladjustment problems to use both methods of compiling data. The clerical work and bookkeeping involved make such a course impossible.

The solution of the problem is of as serious moment to university departments of psychology as to clinical workers. There are many positions for which we would like to recommend psychologists, but in view of the varieties of psychologists available, and in view of the inability of most of these varieties to escape between the horns of our dilemma it hardly seems worth while in many cases to make a recommendation. At this point we present an actual situation showing how the dilemma may affect our judgment in any particular problem.

The writer believes that the solution of the difficulty does not lie in the extension or further elaboration of statistical technique along the lines which are now being followed, Findex systems, card punching devices, and the like. Neither does he believe that an unorganized compilation of case studies or compilations of case studies organized according to the theoretical bias of a single author will be more useful. The actual solution seems to lie in the collection of cases which are in point of fact homogeneous. This method is not a short-cut and presupposes many years of consistent effort. It does, however, offer a consistently increasing body of knowledge which becomes more precise instead of more equivocal as the compilation of records progresses.

J. H. VAN DER HOOP. *Instinct and Intuition in Psychology.*

The psychological concept of instinct has been conceived in a too narrow form under the influence of biology. The study of behavior has to be the starting point for finding the corresponding introspective experience in man. But actions and reactions are not the only expression of instinct in the psychological instinctive sphere. Emotion (*McDougall*) and certain forms of attention and meaning (worthwhileness, *Drever*) belong to it as well. It seems to me that the whole of naïve sensational experience belongs to the instinctive sphere, together with the peculiar structure of this form of experience. Closely connected to it is our emotional reaction. Certain schemes of behavior are set going in relation with such emotions. They are experienced as urges to act on certain sensation-accents. Such accents are liable to being shifted according to experience, and so primary and secondary forms of meaning belong to the psychological idea of instinct together with association of such accents.

On this first layer of experience other forms are built. The first complication is given by a form of behavior discovered in apes by *Yerkes* and *Köhler,* which can best be called "intuitive experience." The corresponding introspective experience in man shows the following characteristics: (a) suddenly the totality of a relation becomes clear, (b) the insight comes as something quite new, (c) it is seen as covering objective facts; there is no doubt, (d) it is a valuable experience of mastering a difficulty. Instinctive meaning means sensation-accents. Intuitive meaning aims at a totality of relation. Learning by instinct means the association of accents. Learning by intuition means seeing relations of a whole.

Instinct gives a more or less continuous contact with reality (with waves of interest). Intuition, hovering over this first form of experience gives flash-light contacts grasping certain relations. Development of conscious forms in man is caused by the interaction of these two forms of experience. A first product is fantasy. It tends to develop in two directions, because instinct has a sensation-side and an impulse-side. By the interaction of intuitions and sensation, ideas about the world arise, expressed in symbols. Fixed symbols (especially word-symbols) make thinking possible. Arguments can be based on the *a priori* of sensation and the *a priori* of intuitive insight. In causality we find again the association of instinctive accents, in finality the intuition of a totality. By the interaction of intuition and the impulse-side of instinct, feeling develops. It produces its own symbols indicating special attitudes and its own forms of relation.

Thomas H. Howells. *An Empirical Study of Religious Conservatives as Opposed to Religious Radicals.*

The chief obstacles to research in the field of the psychology of religion have been (1) the difficulty of obtaining data to the religious experiences of ordinary people, (2) the difficulty of developing demonstrably valid measures of religious characteristics, (3) the difficulty of finding a point of attack on the complex of elusive traits that compose the religious personality, and (4) the difficulty of making exact comparisons of the relative prominence of these traits in the personality. The object of the investigation, which this paper reports, was to develop ways and means of overcoming these obstacles.

A system of self-rating, or reaction test, was developed which showed good reliability ($r = 0.92$) in the differentiation of degrees of religious orthodoxy. This test was given to some six-hundred college students. The information afforded by the test was supplemented by corroborative evidence obtained through questionnaires and other more objective data. The data, thus obtained, were combined objectively and used as the basis for the selection of a group of fifty extreme conservatives in religion and a corresponding group of radicals.

The members of these groups were studied intensively through the use of a battery of psychological tests, supplemented with the application of case-study technique. Significant differences were discovered in intelligence, suggestibility, and persistence.

Thomas H. Howells. *A Test of Persistence.*

The objectives of this study were (1) to measure a factor in human behavior ordinarily referred to as *persistence,* and (2) to determine the correspondence between measures of this trait and two other sets of measures, namely (a) intelligence-test scores, and (b) subject grades of college students.

The general method of testing was to place the subject in several test-situations each of which was so arranged that the only means of making a good score was by excelling other subjects in the voluntary endurance of physical distress or pain. Precaution was taken in the selection of test-situations to insure that mental or physical proficiency could not directly affect the scores. Apparatus was devised and constructed which made it possible accurately to administer, control and measure the pain-stimulus.

As a first step in procedure the subject was advised as to the nature of the test. He was told that he was contesting with the other subjects for rank and that the results might have as much significance for him as his intelligence-test score. This constituted the motivation. In each situation the subject felt no pain to begin with. The stimulus was gradually and uniformly increased until the previously arranged signal, indicating that the limit of endurance had been reached, was given.

The test-situations were as follows: (1) needle pressed into the palm of the hand; (2) hand supported above hot coils; (3) sharp peg pressed into the palm; (4) peg pressed into the wrist; (5) edged instrument pressed against thumb; (6) current of electricity passed through right hand; (7) repetition of number six with left hand; (8) a grip dynamometer which must be held at a value equal to one-half the grip strength.

The test, as described, was given to some one-hundred students in elementary psychology at the University of Colorado.

A review of the data discovered agreement between the sum of the rank-scores of the odd items and of the even items as shown by an r of 0.77, giving an indicated reliability of 0.87. Correlation of combined persistence test scores with intelligence scores gave a coefficient of 0.09. The correlation of persistence with university grade averages was 0.37. The multiple correlation of persistence and intelligence with grades was 0.56.

Clark L. Hull. *Controlled Experimental Investigation of Hypnotic Phenomena.*

Hypnotism for about a century and a half has been largely in the hands of charlatans and mystery mongers. Experimental psychology has now reached a degree of perfection such that it is amply able to proceed with a thoroughly scientific and effective experimental program. The failure of much of the hypnotic experimentation of the past has been due to the failure of the experimentalists to run adequate control series. Concrete illustrative examples of how this may be done will be taken from recent Wisconsin experiments.

Clark L. Hull. *The Concept of Motivation in Psychology as Viewed by a Mechanist.*

The basic notion of motivation to be put forward is that of a persisting dynamic internal component of the stimulus complex. A simple case is where this internal stimulus component dominates the behavior of the organism. If there exists no ready means of bringing immediately to an end the particular internal stimulus, seeking movements of a trial-and-error nature are likely to be evoked by it. The redintegrative mechanism by which these acts are brought about is elaborated. Following this there is presented a mechanistic interpretation of motivation in relation to attention and purpose together with the bearing of the latter on the learning process. Finally there is given a parallel interpretation of motivation in relation to will, to the concepts of determinism and freedom, and to the problem of moral responsibility.

Clark L. Hull. *The Dilemma of the Conditioned Defense Reflex.*

Experimental evidence now available shows the conditioned reflex to be a two-phase phenomenon. Functionally regarded, the primary phase appears to be a tentative, trial, or first-approximation, aspect of an automatic trial-and-error mechanism, while the secondary phase is the selective, corrective, or precision-insuring aspect. By the primary (or redintegrative) tendency of the conditioned reflex any stimulus, which may be playing upon the sensorium at the time a reaction is evoked, tends automatically to acquire the power independently of evoking the reaction. Stimuli thus conditioned but which were only accidentally associated with the unconditioned stimulus are automatically eliminated by the secondary phase, through the principle of experimental extinction which is brought about through failure of reinforcement.

Certain experiments have revealed the tendency of the conditioned reflex, with successive reinforcements, gradually to move forward in time towards the conditioned stimulus until it antedates the unconditioned stimulus. In the case of defense or withdrawal reflexes, the withdrawal reaction, if biologically successful, must prevent the impact of the unconditioned (nocuous) stimulus. This is necessary if injury to the organism is to be avoided; but it would constitute a failure of reinforcement, which is generally assumed to cause an experimental extinction of the conditioned reflex. If this principle should operate, the organism would presently lose the reaction and would be open to the injury until it was reëstablished. This would result in a continuous alternation of injuries and escapes which is hardly an ideal biological economy. If, on the other hand, the tendency to experimental extinction should, for some reason, not operate in this particular situation, the organism will be exposed to the permanent acquisition of all sorts of defense conditionings to merely accidentally associated stimuli from which the organism is normally protected by this mechanism. Here, then, lies the dilemma. Suggestions for modes of experimental investigation of the problem will be made.

WALTER S. HUNTER. *Sensory Control of the Maze-Habit in the White Rat.*

The conventional theory of the sensory control of the perfected maze-habit in the white rat states that the responses constitute a chain of proprioceptively controlled units. I attacked this theory in 1920 upon the basis of work with the temporal maze, a problem which I analyzed further with raccoons in 1928, and with rats in 1929.[1] The present paper continues the discussion on the basis of work upon a bidimensional spatial maze, a tridimensional spatial maze, and a double alternation temporal maze.

In all three mazes the turns at points of choice were arranged in double alternation, right, right, left, left, *etc.* Within each maze all straight sections were of the same length and were so constructed that no differential tactual or olfactory cues were present. The proprioceptive processes aroused in running could vary only at the turns. The rats who mastered these mazes could not have done so on the basis of proprioceptive processes because if these processes were to control the behavior, it would be necessary for the *same* proprioceptive stimulation to condition a turn to the right at one time and a turn to the left at another time. This is impossible unless the stimulus is supplemented in some way. In the bidemensional maze such supplementation might come from stimuli in the environment of the maze, from some symbolic process, or from a neural engram. Of these the first is the simplest and therefore the most probable hypothesis. In the tridimensional maze *directional* stimuli from the environment can play no significant rôle. However, inasmuch as the true pathway constantly enters new parts of the environment, the differential influence of environmental stimuli is not excluded.

Some normal rats were able to master the tridimensional maze. When blinded some still performed perfectly, while others needed to relearn the problem. Those rats who mastered this maze thoroughly after being blinded were transferred to a comparable temporal maze. In this maze all differential exteroceptive cues, both from within and without the maze, were excluded inasmuch as the rat was required to run through the *same* sections of the maze and of the environment from unit to unit of the response.

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[1] *Psychol. Bull.*, 26, 1929, 166.

The successful running of the double alternation temporal maze cannot be explained in the usual stimulus-response terms. Some neural supplement or some symbolic process must be assumed as the differential factor in the control of the behavior. I have found some rats who can master this temporal maze, and J. W. Nagge using another method in my laboratory has found rats who could master double alternation in a T-shaped discrimination box. We are not justified as yet in assuming that a neural engram or a symbolic process controls behavior in the ordinary maze because other and simpler explanatory possibilities are present.

I. HUSBAND, see E. D. STARBUCK.

J. P. HYLAN. *A Dynamic Definition of Religion.*

Most definitions of religion fall into one of two classes. One of these may be called the *static,* the other the *dynamic* class. An illustration of the static group is the definition of Tiele who says: " Religion is that pure or reverential disposition or frame of mind which we call piety." " The essence of piety, and therefore the essence of religion, is adoration." This suggests the attitude of calm quietistic contemplation of the mystic. On the other hand, a dynamic definition is one that implies action in the discharge of religious obligation. Thus James says: " Religious life consists of the belief that there is an unseen order and that our supreme good lies in harmoniously adjusting ourselves thereto." Similarly, Kant speaks of religion as the recognition of all our duties as divine commands. In some instances both of these motives are given as in the definition of Ribot.

The dynamic definition proposed is as follows: Religion is the feeling of tension between the real and the ideal. The following axioms may be derived from this definition. (1) Religion involves the holding of a personal ideal. (2) One is able to evaluate his habits and general status with respect to this ideal. (3) There is a difference between this real and the ideal held. (4) There is a conscious desire to eliminate this difference.

It is frequently said that modern religion lacks the incentive of a more primitive faith. When heaven was held as an ideal of the future and eternal torture was the actual prospect, the tension between these two was naturally great and religion flourished. Conversely, when the ideal and the real coincide there is no tension and there is little or no religion. Hence, to produce religion it is necessary: (1) to formulate and make vivid an ideal different from the real, (2) to impress the disadvantages that arise from this difference, and (3) to instruct as to the method of eliminating this difference. As an illustration of the possible application of this method may be taken its bearing upon disruptive domestic relations.

Carlyle Jacobsen. *A Study of Cerebral Function in the Rhesus Monkey.*

Monkeys were trained on a series of simple and complex puzzle-boxes, requiring the establishment of definite sensorimotor habits, and on the discrimination of simple patterns. The parts of the frontal lobes anterior to the motor areas were then destroyed. Retention tests showed no impairment of the simple habits, a change in the manner of attack on the complex boxes (although there was retention of the elementary responses), and no impairment of the visual discrimination habits. Post-operative training showed no reduction in the ability of the animal to acquire new habits of a similar character.

Edmond Jacobson. *Sleep and Progressive Relaxation.*

In 1908 studies were begun on general muscular relaxation in man which furnished evidence that the onset of sleep is conditioned by the presence of an advanced state of general muscular relaxation. The interpretation was made that the diminution of proprioceptive sensations resulted in diminution of reflex and voluntary activities, thus favoring the onset of sleep. Recent studies point to the particular importance of the ocular and speech mechanisms. The method of progressive relaxation has been used for divers investigative studies of sleep as well as for therapeutic purposes.

G. A. JAEDERHOLM. *An Experiment in Social Psychology.*

JOSEPH JASTROW. *The Conflict of the Psychologies.*

The position of psychology as a science is anomalous in that there is as wide a divergence as to what constitutes the problem and content as there is in regard to methods and conclusions. While this situation is partly the issue of the shift of interest and procedure within the development of a comparatively recent science, more of it results from a contentious insistence that the solutions must be sought and found within a prescribed area and by prescribed methods. Such partisan attitudes led in the older days to schools and cults, and throughout the ages to movements and 'isms.' This tendency is logically indefensible and its effect upon the progress of psychology unfortunate.

The most serious offender is 'Behaviorism,' which ignores the significant fact that all psychology has centered in the study of behavior and insists that the field be limited to what a rigidly objective observation can include. *'Gestalt'* Psychology, though less ambitious, makes some attempt to bring the entire mental life under a single formulation; it is in fact an important correction of the problem of the 'situation' that induces behavior. Freudianism and its derivatives, individual psychology and analytical psychology are frequently misinterpreted as approaches and conclusions applicable to the entire range of psychic problems. In the background stands the older rivalry of a structural psychology displaced by the more vital conception of a dynamic or functional interpretation. While a term as comprehensive in its bearings as any of these, namely naturalistic psychology, would be equally justified.

Science advances not by division into schools and cults nor by conflicts of limiting view-points and propagandist 'isms,' but by refinement of concepts and parallel pursuit of collateral problems in the total range of interest. Psychology must adopt the same attitude if its position among the sciences is to be recognized and made secure.

The impression conveyed to the public, that one must be either a Freudian or a behaviorist or a 'gestaltist' and that, being one, one cannot be the other, is completely misleading. Psychology is one, and scientific method is one. Interests differ: there will be specialists within the psychological as within all other comprehensive fields. Methods suitable to one set of problems will not answer for another. What is essential is to determine the limitations of the behavioristic, the Freudian, the *Gestalt,* or of any other concept that aids in the interpretation of psychic behavior. The conflict of the psychologies results from a false view of the function of a preferred type of interpretation as applied to a selected field of interest. The progress of psychology demands the abandonment of contentious attitudes even more rigorously than the scientific development of significant concepts.

The actual development of psychology is consistently toward a naturalistic view of human behavior; modern psychology is naturalistic. It may be defined as a study of the mechanisms and motives of behavior and their organization. Behaviorism directs attention to the primitive mechanisms that underlie all more elaborate mental phenomena; Freudianism deals mainly in the motivation areas of deeper trends; *Gestalt* psychology considers certain ranges of organization. Such differences of emphasis and interest in no way lessen the central unified purpose of all scientific psychology.[1]

JOSEPH JASTROW. *The Psychology of Minor Deviations.*

Starting with the principle that the abnormal represents the assets and liabilities of a specialized temperament, it follows that by the law of distribution there will be a far larger number of cases of minor deviation than of cases of extreme instances of the same tendencies. The concept may be stated in this formula: the abnormal is but the exaggeration of the normal, and the normal provides the abnormal in miniature. An early recognition of this idea is found in the German term *Minderwerdigkeit,* which amounts to minor disqualification. Professor Overstreet has suggested the terms *micromanic, microdepressive, microparanoia.* That these deviations imply both strength and weakness leads to such a title as Dr. Gehring's *Hope of the Variant.* Psychologists such as Dr. Macfie Campbell and Dr. Adolph Meyer have recognized the significance of this approach. It appears also in the term used by Professor Kretschmer who recognizes the *cyclothyme* and the *schizothyme,* using also the terms *cycloid* and *schizoid* to characterize these tendencies. With these fairly independent recognitions of the same principle, it seems important to give this concept a wider circulation. It is useful in the analysis of character and has the possibilities of developing into a definite test to indicate such incipient tendencies among the normal. Its relation to *introvert* and *extravert* is obvious. Its introduction into the common terminology for psychological uses is desirable. Its application is of importance for the reason that the large number of persons laboring under personal handicaps or deficits (as Dr. House proposes) furnish a considerable clinical material. Social workers and those occupied with corrective discipline should be well acquainted with the many bearings of this principle.

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[1] The complete paper is published in *Scient. Mo.,* 29, 1929, 411–416.

JOSEPH JASTROW. *Deviate and Criminal Behavior.*

The sociological classification of crimes is naturally that of forms of infringement of the social code. The psychological clues lie in the motive patterns of the offense. In terms of urges the three largest classifications (theft, assault and sex) in themselves involve no criminal tendencies. The psychopathic deviations, which are responsible for the criminal manifestations of these three normal impulses, must be sought in psycho-neurotic terms. Thus emotional apathy may prove a clue to such diverse maladjustments as excessive vagrancy, as thrills for criminal excitement, and explosive lack of control. The completely different criminal records of men and women themselves reinforce this position. The relation between mental defect and deviation and no less the clues of glandular unbalance point to the same conclusion. A moronic derelict or other psychopathic personality represents the true deviation, of which the criminal record is an accidental expression.

H. M. Johnson. *Rhythms and Patterns of Nocturnal Motility.*

The time that the subject spends in bed is divided into five-minute intervals which are numbered in order from an arbitrary zero-point. According to the kind of comparison desired, the zero-point is taken at a certain reading of the clock, or at the time of going to bed, or at the beginning of the first period of immotility which exceeds a constant value (*e.g.* 7.5 min.). Each interval is then classified as *active* or *passive,* according as the subject made a major change of bodily position or not.

Two interesting kinds of comparison were yielded. (a) The subject is studied for F nights, and the number, f, of nights during which he stirred in interval No. 1, No. 2. . . . No. n is obtained by actual count. The ratios, f_1/F, f_2/F, ... f_n/F, express the relative frequencies of movement within the intervals indicated by the subscripts. The graph of f/F plotted against the interval-number shows a definite rhythm, which is quite different for different individuals. It was first supposed to be a personal characteristic, but fractionation of the data according to a suggestion of Mr. C. R. Garvey has modified this interpretation.

(b) The temporal distributions of motility of two persons (husband and wife, parent and child, *etc.*) who sleep in the same room, but on different beds, were taken night by night and were found to be uncorrelated. Two individuals (brothers), whose *average* frequencies of movement were the same, present a conservative though fairly typical case. During 44 per cent of the night the records disagree by at least five minutes, on the question of stirring or lying still. The probability of perfect agreement during any night is practically infinitesimal.

The results emphasize the comparatively small importance of light, noises and other common external stimuli in the production of stirring.

H. M. Johnson. *A Typical Paradox in the Results of Measurements of Intelligence.*

In many current treatises on general intelligence one is presented with two distinct concepts thereof. According to the first, general intelligence is a unitary personal trait. Each person is born with a measurable quota which is determined by his ancestry and is unchanged with time. It is said to resemble the number of the elect, in that it is so certain and definite that it cannot be either increased or diminished. According to the second concept, general intelligence is whatever determines the relative rating (percentile rank) of an individual in some defining performance. ("Intelligence is whatever this intelligence-test tests," *etc.*) These two concepts are called by the same name and are otherwise treated as identical. A very simple and obvious procedure shows that their identification is illicit and preposterous.

If the same group of contestants be required to undergo the same defining performance on two different occasions, they do not tend at all strongly to attain the same relative rank both times. The correlation obtained between the two sets of rankings varies rather widely in different experiments and with different experimenters; a value of about 0.85 is rather larger than the most representative of those which I have seen. Such findings mean that if one estimates the one rating from the other by means of the regression-equation, the probable error will be a little over half as large as it would be if one had merely guessed that each individual received the average ranking of the group. The ratings are therefore pretty unstable. The fact presents a dilemma. On the one hand, if general intelligence is whatever determines the individual's rating, then it is not a stable trait; it is not determined at birth and unchanging with time. On the other hand, if general intelligence has these characteristic properties, then it is not passably defined by these ratings.

If the same procedure is applied to determinations of the so-called intelligence quotient at different ages, a similar result is obtained, which shows the alleged proof of 'constancy of intelligence' to be absurd.

H. M. Johnson. *The So-Called 'Coefficient of Reliability.'*

While arbitrary definition is a logically valid procedure, it sometimes produces a very unstable modification of the symbolic habits of author and reader. The arbitrarily defined term then becomes ambivalent. This is true of the term *coefficient of reliability,* which is not a constant of proportionality (such as the coefficient of expansion, the coefficient of transmission, *etc.*, but which because of its name is intermittently treated as if it were.

In ordinary discussion the meaning of the word *reliable* is remarkably rigid. Likewise the peculiar property of a perfectly 'reliable' classification-test is undisputed: it permits an *errorless* inference of the rating of an individual rendered at one time from the known rating rendered at another time. In other words, the standard deviation, s, of the observed ratings from the values calculated by means of the regression-equation would be zero, whatever form the equation might have. If, however, the test is perfectly 'unreliable,' the two sets of ratings are mutually independent, and $s = \sigma$, in which σ is the standard deviations of the 'unknown' set of ratings from their own mean. The expression, s/σ, represents that fraction of the unreliability attending a worthless test which inheres in the test in question; while the expression, $1 - s/\sigma$, defines the fraction of unreliability from which the latter test has been freed. We express the ordinary use of the word precisely if we define *reliability* $\rho \equiv 1 - s/\sigma$. But where the method of correlation is applicable, $s/\sigma \sim \sqrt{1 - r^2}$, in which r is the coefficient of correlation between the two sets of ratings. In this case, which is special, we may substitute $\sqrt{1 - r^2}$ for s/σ in the defining equation, and write $\rho \sim 1 - \sqrt{1 - r}$. Reliability is therefore measured by ρ, relatively to the reliability of an ideal test. Regard for convention should have resulted in ρ being called the 'coefficient of reliability,' rather than r or the supposed equivalent of r (namely, the coefficient of correlation between the two half-scores corrected for attenuation). Unfortunately numerous authors after calculating r have given it the meaning of ρ; *e.g.* after saying that r, the so-called 'coefficient of reliability,' is (say) 0.75, they argue that the classification is 0.75 times as reliable as a perfect classification, whereas the proper factor is only 0.34. This ambivalence has produced grave confusion, and has led to reliance upon classifications that are actually dubious.

The designation of r as the 'coefficient of reliability' should cease; ρ should be employed as the proper criterion, and called, perhaps, the "coefficient of dependability," if it must be christened at all.

L. WYNN JONES. *Some Aspects of Mental Inertia.*

There is cumulative evidence that mental inertia is a factor of wide range.[1] It is even probable that its scope may include orectic as well as cognitive processes. But as Spearman's law of inertia[2] deals with the latter, attention is here directed to certain sensory, motor and ideational aspects.

Progress in such a study would appear to depend on employing the methods of Lankes;[3] namely, (1) a thorough analysis of all phenomena which appear to be expressions of inertia, such as (a) the persistent after-effect of a sensory or even ideational stimulus, (b) the spontaneous recurrence to consciousness of an experience, or (c) the inhibition of a succeeding experience by the effect of one preceding, and (2) the devising of tests suitable for rendering measurable any of these manifestations. The data may then be examined in the light of available statistical criteria.

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[1] Cf. C. Spearman, *The Abilities of Man,* 1927, chap. 18; W. Lankes, Perseveration, *Brit. J. Psychol.,* 7, 1915; L. Wynn Jones, Perseveration, *Rep. Brit. Assoc.,* 1915; E. Bernstein, Quickness and intelligence, *Brit. J. Psychol.,* Mon. Suppl., 7, 1924; H. L. Hargreaves, The "faculty" of imagination, *Brit. J. Psychol.,* Mon. Suppl. 10, 1927; K. B. Sen Gupta, An enquiry into some perseverative tendencies in school children, thesis (on file), Leeds, 1928.

[2] Spearman, *The Nature of 'Intelligence' and the Principles of Cognition,* 1923, 133.

[3] Lankes, *op. cit.,* 389.

A supplementary method is to follow the lead of Wiersma[4] and test suitable cases of abnormal subjects, notably cases of mania and melancholia, when due care is taken to minimize the complications which may arise with such subjects.

(a) After some experience with such methods it is suggested that the progression, mania—normality—melancholia, may not correspond to the progression, non-perseveration—normality—perseveration, as closely as has usually been thought. Thus it was sometimes found that the absence of inhibiting motor forces in mania caused patients to appear as perseverators in certain motor tasks.[5] To ensure more data the scale + 3, + 2, + 1, 0, — 1, — 2, — 3 is now being used to denote the state of exaltation or depression of each patient at the time of testing.

(b) Not only do some tests prove more effective than others but it is also possible that some which might *a priori* be regarded as tests of inertia would in practice appear to be independent of it. Thus Hargreaves[6] has produced evidence that certain 'fluency' tests are independent of perseveration. As the present writer found some 'fluency' tests useful in separating a manic group from a melancholic group, a more comprehensive study of such tests with normal subjects has been undertaken.

It would seem that investigations along such lines would give the term inertia a stricter denotation.

L. WYNN JONES. *Units of Measurement.*

Before an individual can be said to possess (1) a delicacy of touch or (2) an innate mental ability or (3) a temperamental trait like sociability to a predictable degree, due regard must in each case be given both to the unit and to the variability of measurement.

If in (1) the task is to hit a hammer ten times so as to cause a column of mercury to rise to a particular point, the difficulty is not in fixing on the unit but in the fact that an individual's variability from day to day may be so great that the practical value of calculating his delicacy on a particular occasion may be doubtful.

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[4] E. Wiersma, Die Sekundärfunktion bei Psychosen, *J. f. Psychol. u. Neurol.*, 8, 1906.

[5] Wynn Jones, Individual differences in mental inertia, *J. Natl. Inst. of Indust. Psychol.*, 4, No. 5, 1925: cf. also An investigation into the significance of perseveration, *J. Mental Sci.*, 74, 1928.

[6] Hargreaves, *op. cit.*

In (2) it is generally assumed that daily variations are comparatively small, but the difficulties in fixing on a unit are correspondingly great.

In (3) the variability of the individual may be left out of consideration and the variability of the estimate may be ascertained by noting where the examiner places a dot along a finite line.

VERNON JONES. *The Assumption of Agreement on Right and Wrong.*

Legal punishment assumes individual responsibility. Before the criminal law every person falls into one of two categories: either he knows the difference between right and wrong and, so far as the right-and-wrong test is concerned, is normal, or else he is not capable of distinguishing between right and wrong and is judged to be irresponsible for his acts. From this premise that all 'normal' people *know* the difference between right and wrong, we may argue that a sampling of persons who are ordinarily considered as 'normal' ought to agree (*i.e.* have the same knowledge) as to the rightness or wrongness of certain acts.

This logical conclusion from the foregoing premise was submitted to statistical study by presenting written descriptions of 68 childhood situations to several hundred school teachers and prospective teachers. The instructions were that the proposed action in each situation be marked as "right," "excusable," or "wrong." There were only 12 situations out of the 68 where as many as 90 per cent of these adults agreed as to the rightness or wrongness or excusability of the proposed action.

A further study was made to find out if they agreed as to what was right, excusable, or wrong (1) according to the social convention and (2) according to their own ideals. On the former there were 5 out of the 68 situations where there was as much as 90 per cent agreement on either right, or excusable, or wrong; on the latter there were 21.

In the light of these findings it seems that the assumption that persons can be divided into the two categories (those who know the difference between right and wrong, and those who do not) is not well founded. These findings seem to be consistent with the theoretical view that as civilization changes, new elements enter into the consideration of right and wrong, and different elements may become prepotent in different circumstances and with different people.

ANDREW JUHÁSZ. *The Body-Soul Problem.*

The body-soul problem is one of the oldest questions in psychology. The standpoint of *dualism* is the inheritance of an old superstition and scientifically entirely unfounded. The thinkers of the modern age (Darwin, Fechner, Haeckel, Ostwald, Verworn) endeavored to derive the whole universe from only one substance.

The greatest mischief is the confusion about the word *psyche.* The psyche of psychology (*mind*) is not identical with the psyche of metaphysics (*soul*). I will show that the mind is a *medium* between body and soul, between material and immaterial. Like the immortal energy in physics, which can be transformed into material (Lorentz, Einstein) and which has material attributes (after the quantum-theory), it is also atomized.

The mind can be considered as either a higher body or a lower soul. So said Aristotle about the νοῦς παθητικὸς in opposition to the νοῦς ποιητικὸς, Kant and Hoffding about " reales Ich," and G. E. Müller about " immanentes Ich," in opposition to the " formales " and the " transzendentales Ich," respectively. So say, on the other hand, the occultists about ' materialization-phenomena,' the anthroposophists about an ' astral-body,' and St. Paul about a ' mental body ' in opposition to the ' sensual body.'

Have we now a triality instead of the old dualism? By no means. Body, soul, and mind are not three different substances, only different degrees of one reality (*monism*), and this is the soul. The soul realizes himself in the body and out of this realization arises the mind. The mind (νοῦς παθητικὸς, mental body) is a criterion of life and a bridge between the immortal soul and the lifeless mass.

The form in which the mind appears is *time,* which must be *relative,* because the living mind shapes a moving system and all our psychical experiences are related to this system. Life does not mean an objective space of time; it is only a period of the infinity. The possibility of the soul's realization (mind) has always slumbered in the body as the aboriginal energy of Einstein. The birth of the *individuum* is the actualization of potency and death is the transformation of actuality into potency again.

The realization is not a sudden action; it begins only with birth and lasts till death, until the potencies are exhausted. It is not a flowing procession, but it ensues eruptively (possibility of a psychological quantum-theory).

Jules-Bois. *Psychology of the Superconscious.*

It is beyond question and has been frequently remarked, that inspiration, creative power, fecund originality, and invention, to which we are indebted for works of art and scientific discoveries, in short, for our civilization and progress, have hitherto eluded psychologic analysis. Certain luminous pages of James, Ribot, and Poyot touching upon the creative imagination have scarcely opened up the ways. This creative force, which in its applications assumes various aspects with varying temperaments, *milieus* and circumstances, has hardly emerged from empiricism. All the more reason is there for studying it now, with a view to utilizing it, if possible, as has been done with so many other physical and even intellectual forces.

We find ourselves at the intersection of ethics, esthetics, and psychology; but this faculty, confined to man, belongs rather to psychology proper, since it has been laid hold of in the laboratories of psychotherapy and mental orthopedics to awaken moral consciousness in those afflicted with maladies of the will and nervous system, and so to cure them. Scientific nomenclature requires a name for everything with which it deals. This human power (I use the term with no suggestion of mysticism) I propose to call the *superconscious,* in order to differentiate it from the middle and average conscious states, where it appears rarely, and from the lower subconscious states, where it does not exist at all. We are justified in calling it superconscious because it is attended by a plenitude of consciousness, a more complete and more intense living, well known, for instance, to the artist and scholar when they feel inspiration, to the business man when he has brought to success a vast undertaking, to the statesman when he has solved a national or international problem, to the patient when he returns to health, to the philanthropist when he has achieved a difficult and meritorious deed.

This energy also seems, in its manifestations, to summon other energies, of which we are the synthesis, since it unifies them. It is commonly wanting in the abnormal person, where it has been lost; but, on the contrary, we see it coördinating the faculties of the normal man and carrying the superior man's talents to their highest limit. It renders the man at once unified and efficient. The psychology of the superconscious is not, then, merely a department in the vast study of the human being. It does not confine itself to the analysis of genius as yet confused; in any case it reveals genius as a work of regeneration and not a phenomenon of degeneration.

This psychology of the superconscious appeals to all, for it leads not only to the study but to the formation of character, which our teachers have trained us to consider the chief aim of applied psychology. In fact, the truly great men, those who have served the human race, are those who have had the most character. They are our guides and examples along these roads, which we follow as closely as our capacities permit. To mention only three, Socrates, the founder of psychology, Lincoln, the unifier of his country, Joan of Arc, creator of France, were, in life and in death, the martyrs and prophets of the superconscious within us.

GUSTAV KAFKA. *Zur Psychologie des Ekels.*

Der Ekel ist eine eigentümliche psychische Abwehrreaktion, die sich ausschliesslich gegen " Provenienzen des Organischen," d. h. gegen alle Aus- und Abscheidungen (im weitesten Sinne) richtet, die aus einem lebendigen oder toten Körper herkommen. Der Ekel ist fundiert in Empfindungsinhalten, doch besteht der Unterschied, dass nur in Tast-, Temperatur- und Geruchsempfindungen der Ekel zur Selbstgegebenheit gebracht werden kann, während die übrigen Empfindungen höchstens auf assoziativem Wege Ekel zu erregen vermögen, soweit sie an die sinnlichen Qualitäten eines ekelhaften Gegenstandes erinnern. In beiden Fällen wird aber der Ekel nicht unmittelbar durch die blosse Empfindung erzeugt, es bedarf dazu vielmehr eines " Wissens um " die Zugehörigkeit der sinnlichen Inhalte zu einem bestimmten Gegenstand, also einer intentionalen Objektbezogenheit (eben auf Provenienzen des Organischen). Nach der affektiven Seite ist das Erlebnis des Ekels einerseits durch eine starke Unlustkomponente, andererseits durch das Streben charakterisiert, den Kontakt mit ekelhaften Gegenständen und noch viel mehr deren Einverleibung zu vermeiden.

Der Ekel kann insofern einer Inversion unterliegen, als im Zustand der sexuellen Spannung gerade die Provenienzen, die vom Körper der sexuell anziehenden Person stammen, statt der abstossenden eine anziehende Wirkung ausüben. Von dieser Inversion wird die Mehrzahl der Gegenstände und Inhalte betroffen, die beim Fehlen der sexuellen Spannung Anlass zur Entstehung des Ekels geben. Dagegen verkehrt sich durch die Veränderung der "inneren Stimmung" der affektive Charakter und die effektive Aeusserung der Reaktion in ihr Gegenteil: der Geschlechtstrieb erscheint in zwei Partialtriebe aufgespalten, den Ingressionstrieb, der den Körper des Geschlechts partners nicht nur zu berühren (Kontrektationstrieb), sondern sogar in ihn einzudringen sucht, und den Intussuszeptionstrieb, der die Provenienzen des Geschlechtspartners in sich aufzunehmen strebt. Mit dem Schwinden der sexuellen Intention auf eine bestimmte Person unterliegt die Inversion des Ekels wieder einer Reversion.

Die biologische Bedeutung des Ekels und seiner Inversion ist vermutlich darin zu suchen, dass der Ekel ein Regulativ der geschlechtlichen Beziehungen beim Menschen bildet, indem er ein Ueberwuchern der geschlechtlichen Betätigung verhindert, das sonst beim Fehlen der durch die Brunstperioden bewirkten Beschränkung im Bereich der Möglichkeit läge, während die Inversion die Hemmungen des Ingressions- und Intussuszeptionstriebes, welche der Ekel allgemein erzeugt, gegenüber einzelnen Personen oder Typen zum Zwecke der geschlechtlichen Betätigung wieder aufhebt.

David Katz. *Gebärdensprache und Entwicklungspsychologie.*

Jeder normale Mensch pflegt seine lautsprachlichen Äusserungen von sichtbaren Gebärden zu begleiten, die für das Verständnis seiner Ausführungen von beträchtlicher Bedeutung sind. Die Gebärde ist für die Unterhaltung nicht unbedingt erforderlich, wie etwa das Beispiel der Blinden zeigt, sie ist aber andererseits, auf sich selbst gestellt, sehr tragfähig, ja bei Erweiterung zur konventionellen systematisierten Gebärdensprache nahezu beliebig leistungsfähig, wie die Beobachtung mancher Taubstummen zeigt.

Auf meine Veranlassung hat Herr Witte im Rostocker psychologischen Institut die Leistungsfähigkeit der nicht-konventionellen Gebärdensprache in zahlreichen Experimenten mit Kindern und mit Erwachsenen experimentell zu bestimmen versucht. Der Versuchsleiter versuchte schriftlich fixierte Sätze, die von einfacheren zu schwierigeren und schliesslich zu ganzen Erzählungen aufstiegen, seinen Versuchspersonen rein gebärdlich zu vermitteln. Den Versuchen lag die Fiktion zugrunde, dass man in fremdem Land Menschen etwas mitzuteilen habe, die nicht ein Wort der eignen Sprache verstehen.

Die Versuche sind sehr ergebnisreich gewesen. Wir wurden mehr dadurch überrascht, wieviel sich tatsächlich gebärdlich ausdrücken lässt, als dadurch, dass die Grenzen des Darstellbaren mit Steigerung der Abstraktheit sehr bald erreicht werden. Die gegenwärtige Situation ist das eigentliche Herrschaftsgebiet der

Gebärde. Vergangenheit und Zukunft lassen sich dem gebärdlichen Ausdruck mit einiger Sicherheit nur dadurch erobern, dass man für Versuchsleiter und Versuchsperson eine die Gegenwart überschreitende gemeinschaftliche Erlebensbasis schafft. Versuche zu diesem Punkt lassen erkennen, wie vermutlich in Erlebnisgemeinschaften konventionelle Gebärden für abstraktere Beziehungen entstanden sind. Bei gebärdlicher Verständigung ist im Gebärdenden sowohl wie bei dem, an den man sich wendet, eine weit grössere innere Aktivität festzustellen als bei lautsprachlicher Verständigung. Die Gebärde wird auf ganzheitlicher Grundlage verstanden. Bei einer längeren Geschichte erfolgt das Verständnis des Ganzen nicht selten vom Ende her.

Es sind die verschiedenen Satzkategorien sowie die verschiedenen Satzteile auf ihre Gebärdbarkeit hin untersucht worden. Bei dieser Untersuchung drängen sich einem die weitgehenden Parallelen zwischen Gebärdensprache und Kindersprache auf. Die Entwicklungsstadien der Kindersprache machen sich in Schwierigkeitsstufen der Gebärdbarkeit geltend. Die Einwortsätze des Kindes sind affektiv-volitional, Sätze von solchem Charakter sind leicht gebärdlich darzustellen. Aktions- und Substanzstadium treten früh beim Kind auf, wir finden sie in der Gebärdensprache wieder. Das Verb tritt in beiden Sprachen zuerst in der Präsensform auf. Diese und zahlreiche andere Parallelen können sowohl dazu dienen, die Gebärdensprache wie die Kindersprache der Struktur nach aufzuklären.

Die experimentellen Befunde sind auch von Bedeutung für das Verständnis der Entwicklung der Gebärdensprache bei den Naturvölkern sowie der menschlichen Sprache überhaupt, soweit man bei ihr eine Mitwirkung der Gebärdensprache annehmen darf.

DAVID KATZ. *The Development of Physiological Hypotheses as a Basis for Experimentation.*

1. Für die Prüfung der Frage, welche Bedeutung physiologische Hypothesen als Basis für psychologische Experimente gewinnen können, ist eine Untersuchung darüber von Wichtigkeit, welche Dienste physiologische Hypothesen der Psychologie der Sinneswahrnehmung in der Vergangenheit geleistet haben.

2. Die meisten physiologischen Hypothesen, die in der Sinnespsychologie angetroffen werden, stellen sich bei kritischer Betrachtung dar als mehr oder weniger verklausulierte Uebersetzungen psychologischer Befunde in eine physiologische Sprache. Hypothesen dieser Art haben keinen echten Erkenntniswert und sind als Grundlagen für psychologische Experimente nicht zu verwenden.

3. Man trifft Hypothesen an, die im Gegensatz zu den eben genannten von einer allgemeineren physiologischen Basis aus konstruiert sind. Hierher ist z. B. Herings Assimilations-Dissimilations-Hypothese der Gegenfarben zu rechnen. Auch diese physiologischen Hypothesen haben kaum zu wertvollen psychologischen Fragestellungen geführt und sind grösstenteils wie die beispielweise angeführte Hypothese Herings selbst phänomenologisch widerlegt worden.

4. Kaum ein anderer Forscher hat sich mit seiner grundsätzlich deskriptiv-phänomenologischen Einstellung für die Entwicklung der modernen Sinnespsychologie so viel getan wie Hering. Es sei erinnert an seine Ausführungen über den positiven Charakter der Empfindung Schwarz, über die Ordnung der bunten Farben sowie über die sogenannte Farbenkonstanz der Sehdinge. Diese Ausführungen haben sich als ungewöhnlich fruchtbar erwiesen und zwar nicht nur für das Gebiet der Farben. So weit ich sehen kann, sind alle wesentlichen Fortschritte der Wahrnehmungspsychologie dem besser geschulten phänomenologischen Blick zu danken und nicht der Zugrundelegung physiologischer Hypothesen. Die Ueberwindung des Atomismus in der Theorie der Sinneswahrnehmung ist von der phänomenologischen Seite her erfolgt. So ist z. B. die Feststellung der phänomenalen Realität der Beleuchtung—eine der ersten Feststellungen ganzheitlichen Charakters in der Wahrnehmungspsychologie überhaupt—eher im Gegensatz zu den herrschenden physiologischen Anschauungen als in Uebereinstimmung mit ihnen erfolgt. Ich glaube, dass eine Prüfung der konkreten Forschungsergebnisse auch für die Entdeckungen der Gestaltpsychologie meine Anschauung von dem Primat der phänomenologischen Betracht-

ungsweise, die selbstverständlich durch kausalgenetische Erwägungen ergänzt werden muss, bestätigen wird.

5. Unverwendbar erscheinen mir physiologische Hypothesen für die Erarbeitung der "materialen" Seite der Wahrnehmung (Farbmaterie, Tastmaterie usw.). Es verbleibt die Verwendung der Hypothesen auf Probleme der Erscheinungsweise, der Formung, der Gestaltung. Schwer vorstellbar scheint mir die Verwendung für Probleme der Invarianz, die zurzeit das besondere Interesse finden.

6. Die Ueberlegenheit der deskriptiv-phänomenologischen Methode ist letzten Endes dadurch bedingt, dass es vorläufig kein empfindlicheres Kriterium und Kontrollmittel für Geschehen im zentralen Nervensystem gibt als das Bewusstsein.

TRUMAN L. KELLEY. *The Nature of* g.

To investigate the nature of g we must return to the experimental features which, when present, lead us to postulate such a factor. These features are found in certain relationships between the correlation coefficients existing between scores made upon four or more psychological tests. Illustrations can readily be given wherein the conditions maintain which warrant the assertion that a g-factor is present, but wherein it is known that no mental organization of the subjects tested accounts for it. A consideration of such situations helps in the understanding of other less completely analyzed situations wherein a g-factor is indicated.

TRUMAN L. KELLEY. *The Definition and Measurement of Native Ability.*

The terms *native ability, original nature,* and *heredity* have been used loosely at times by biologists and psychologists, and in other instances have been differently defined. Undoubtedly more confusion has arisen from inadequate definition than from differences in definition. If the issues connected with heredity and environment are to be studied quantitatively, it is necessary not only that the definition of each of these terms be specific but also that it be in terms of behavior or conduct, else it cannot be treated in an objectively measurable manner.

The biologist's definition of *heredity,* which refers it to genetic structure only, gives it meaning in terms of what is transmitted from germ-cell of parent to that of offspring. It is insufficient for the experimentalist, be he biologist or educator. The characteristics of the germ are to be inferred only from somatic phenomena of the individual in question or of his forebears or progeny, and the rules for inference which are to be followed are basic to any understanding of the term. They are, in short, a part of any complete definition of it.

Different experimental tests follow differently defined connections between somatic phenomena and original nature. In this connection the biologist's problem is radically different from the psychologist's, for, according to his hypothesis, time is not a factor; his interest is from germ-cell to germ-cell. He is indifferent to the intervening somatic phenomena of growth which are the peculiar concern of the psychologist.

TRUMAN L. KELLEY. *Units of Measurement.*

In the development of a science of educational and psychological measurement a great deal has undoubtedly been accomplished with measuring instruments having ill-defined and uncertain units. It is profitable and interesting to raise the question as to how this has been possible and to attempt to picture a future progress built upon units which are carefully defined in harmony with certain distinctive features of mental life. The determination of what these features are, may well be the next important step in psychological progress.

TRUMAN L. KELLEY. *Statistical Method.*

Statistical method is in fact playing an increasingly large part in psychological investigation. Though its critics are to be found both in the older and the younger generation, nevertheless these same critics commonly resort to statistical expression in reporting their own investigations. At one moment they may use a very inadequate statistical technique and in the next proclaim a disbelief in statistics. Such disbelief is no logical defense for inaccuracy or insufficiency in technique. It has been characteristic of each science that, as it has developed, measurement, mathematics, and statistics have entered in more intimately and extensively. We may expect that the future of psychology will involve both more and better statistics.

C. E. Kellogg. *A Social-Psychological Version of the Aesthetic Attitude.*

The inadequate provision for aesthetics in most college curricula is due in part to certain prejudices, but more to misunderstanding of the subject. The difficulty is due to isolated treatment, from the structuralist standpoint, and the attempt to approach the psychology of beauty directly. The usual treatment of natural beauty as primary leads to obscurities in analyses of the aesthetic attitude, which are avoided by discussing the various arts first, and as social institutions. All the arts are important as means of communication or accessories thereto, so discussion of other arts should be linked with that of literature.

From the standpoint suggested here, various familiar analyses of the aesthetic attitude may be summed up as simply stating the necessity for avoiding confusion between art and reality. The suggestions for avoiding this confusion—" preserving aesthetic distance "—given in standard works are of course none the less valid. Any theory must come to terms with natural beauty. This is here held to be secondary, so the validity of the theory depends upon accounting for the aesthetic attitude in connection with reality. Our view is justified if we can show that the attitude is transferred from art to reality, that its exhibition in real situations is commensurate with the art experience of the persons concerned.

In certain fundamental cases the attitude may now be established on a hereditary basis, and the extent and fields of susceptibility may vary in individuals. Art for art's sake is possible to some individuals, but treatment of the arts as social institutions corrects overemphasis upon technique. The artist must have something to communicate, and this is subject to moral considerations, though not necessarily in the sense of 'having a moral.' It is more important that the arts lead to enlargement of self-consciousness. This suggests a supplement to McDougall's discussion of the development of the self-regarding sentiment and social conduct, leading to the conclusion that the ultimate sanction for the moral life lies in the aesthetic attitude. The attitude is of similar significance as motive for scientific research and philosophical speculation.

ELAINE F. KINDER and HANS C. SYZ. *Further Aspects of the Galvanic Skin-Reflex in Different Psychopathological Groups.*

Studies of investigators who have examined certain physiological part-functions such as the respiration, pulse, blood-pressure, pupillary reactivity, *etc.*, have not been very encouraging from the standpoint of definitely relating these physiological functions to psychopathological reaction types. The electrical skin-resistance and the psychogalvanic reflex, however, according to our own studies and those of others, show certain variations corresponding to behavior types. The present report is concerned with differences in the content reacted to by the different groups.

A standard list of stimulus words was presented to individuals of four groups: normal, depressive, catatonic, and paranoid schizophrenic. It was found that the depressive group showed a tendency toward reactions to words indicative of situations of disappointment and sorrow. The schizophrenics hardly emphasized any specific topic, thus giving evidence also in this respect of a rather scattered emotional organization. This was in striking contrast with the normal controls who in several groups gave a definite predominance of reactions to sexual topics, to the calling of their names, and to other topics of normal interest.

While through the galvanometric method the topics may be elicited which are of predominant interest or emotional value, there are no specific characteristics in the individual galvanic reactions which would allow a differentiation of the various types of emotional response. The differences between affects, as they are recognized through subjective experience and in various forms of motor expression, are apparently not expressed in the electric skin-reflex.

H. Kirihara. *On the Mental Development of the Japanese.*

The purpose of this paper is to study intellectual development in childhood, adolescence, and maturity, and to offer civil workers and psychotechnicians some reliable data and normal test methods.

The tests were composed of recognition, completion, analogy, and Rybakow figure tests; 11,949 persons (6,090 male, 5,859 female), aged 6 to 40, were examined. They were the pupils or students of various kinds of schools, workers, professional persons, and soldiers in active service and in reserves. The reliability coefficients, partial coefficients, and correlation coefficients with other test-results were computed.

Results: (1) The development curve obtained from the average score of every age rises more rapidly in apprehension and recognition than in reasoning. (2) From 6 until 12 or 13 years of age the development curves of recognition ascend nearly in a straight line and those of reasoning run first in an accelerative curve and thereafter in two curves. The one curve is that of the school pupils who are selected by their mental abilities to enter the advanced schools. The other is that of children at work after leaving the primary school (at 12 years of age). The former rises more rapidly than the latter, and the discrepancy becomes larger with age. But each of them comes to a plateau at about the same time, at 18.5 years of age for boys and at 17.5 for girls in each of the four tests. This is consistent with Prof. Y. Sakaki's results derived from the study of the development of memory, association, fluctuation, and efficiency of simple mental work in the Japanese pupils. (3) Boys below 12 years old excel girls in all tests except in that for recognition. (4) From 10 until 13 years of age for boys and from 9 until 12 for girls, the development curves rise very rapidly. (5) Following the investigations of Prof. Miwa, Prof. Mishima, and Prof. Taguchi, the bodily development of the Japanese boys becomes null at 18.5 years of age, and that of the girls at about 18 years of age.

HARRY DEXTER KITSON. *A Method of Measuring the Interest of a Worker in His Work.*

In attacking the problems concerned with interest as a factor in vocational adjustment most investigators have concentrated on devising methods for detecting alleged vocational interests in persons who have not yet entered vocational life.

The writer has chosen a new approach,—investigation of the interest which workers already in vocations have in their work. The method employed is to make a scale from 0 to 100, with ten steps. The subject is asked to place himself on this scale with respect to his interest in his occupation, considering as the 100 degree point that activity in which he would spend the major amount of his time if he were freed from the necessity of earning a living.

Thus far the scale has been submitted to several vocational groups, for which norms and distributions are available. Such data gathered from workers in a large number of vocations will permit comparisons regarding the relative degrees of interest which workers have in these occupations. They will also show where any individual stands in relation to other members of his occupational group.

Facts showing the age at which the individual chose this vocation and the number of years he has been engaged in it will, in relation to those mentioned above, throw some light on the nature and development of vocational interest.

D. B. KLEIN. *The Experimental Production of 'Dreams' During Hypnosis.*

Since the assumption that sleep and hypnosis are kindred phenomena has been accepted as a working basis, an attempt was made to determine whether those mental states traditionally regarded as characteristic of sleep could also be aroused during hypnosis. The attempt met with success.

In brief, the method consists in hypnotizing the subject and then urging him to observe the possible occurrence of " a dream or other mental experience and to report the result the instant the experience has vanished." Following the instigation of this mental set the presentation of any stimulus at all—a whiff of perfume, a sound of a tuning-fork, pinching the hand, a piece of cold metal applied to the forehead, or even a word—usually gives rise to mental phenomena that are either identical with those of normal sleep or very closely allied to them. Results obtained by this method so far, indicate that the term *dream* may legitimately be applied to the phenomena produced. The method permits the duration of the dream to be determined. Among the problems seemingly amenable to experimental investigation by this method are the following:

(1) The experimental verification of theories of dreaming.

(2) The relationship between psychoanalytic symbols and dreams produced by them.

(3) The legitimacy of the distinction between latent and manifest contents.

(4) The nature of the dream response to a recurrent stimulus.

(5) The modification of dream patterns by the simultaneous application of two or more stimuli.

(6) The relationship between dream events and the accuracy of their recall after waking.

(7) The frequency of sex dreams as compared with others.

(8) The relationship between the duration of a dream and its complexity.

(9) Structuralist analyses of dream contents.

(10) The ' dream ' as a unit of thinking.

In connection with the last problem evidence will be presented by way of confirming Hollingworth's concept of the redintegrative nature of thinking particularly when the thought process is analyzed in the light of dream phenomena. The unitary nature of

the redintegrative pattern is clearly exemplified in many hypnotic dreams. The method may render it possible to define the boundaries of a ' unit ' of thinking.

Evidence is also presented to show that so-called dreamless sleep may be an amnesic phenomenon: one of our subjects has very vivid dreams which he reports during hypnosis and upon waking he denies having had *any* dreams or other mental experiences. Other subjects, of course, recall many of their dreams immediately after waking.

OTTO KLEMM. *Ansätze zu einer Theorie des Tuns.*

Im Zusammenhange mit Fragestellungen der angewandten Psychologie über die Grundlage von Geschicklichkeitsleistungen bin ich darauf aufmerksam geworden, dass das zielstrebige, körperliche Tun des Menschen in manchen Fällen mit einer Genauigkeit abläuft, die derjenigen seiner Teilstücke merklich überlegen ist. Wenn der Mensch mit einem Ball nach einem Ziele wirft, so ist die Wurfweite von der Stärke des Wurfes, von dem Abgangswinkel und von der Stelle und Art des Loslassens abhängig. Alle diese Teilstücke sind einer Streuung unterworfen. Die Genauigkeit, mit welcher der Gesamtvorgang " Werfen nach einem Ziele " abläuft, ist aber nicht, wie bei einem Zusammenwirken mechanischer Vorgänge, durch diese Einzelstreuungen bedingt, sondern sie kann, zum mindesten bei geschickten Menschen, grösser sein. Ich vermochte zu zeigen, dass bei einem guten Werfer die Streuung der Einzelwürfe um das Ziel bis auf 1/60 der Wurfweite heruntergehen konnte, und diese Genauigkeit war eben grösser als jene, mit welcher die einzelnen Teilstücke dieses Aktes hergestellt werden konnten. Überraschend war es auch für mich, wie nahe hierbei der Mittelwert solcher Würfe an das Ziel heranzurücken vermag. Beim Werfen nach einem Ziele in 5 m. Entfernung war der " konstante Fehler " bisweilen nur 1 bis 2 m.—ein Beweis für die Wirksamkeit einer übergreifenden Zieleinstellung, die nicht nach Analogien einer mechanischen Vorrichtung zu deuten ist.

Hiernach scheinen auch für das Tun des Menschen die Sätze der Ganzheitspsychologie zu gelten, dass das Ganze mit seinen Eigenschaften denen seiner Teile überlegen ist. Insonderheit zeigt sich dies darin, dass ein solches Tun mit einer Genauigkeit und Zielsicherheit abzulaufen vermag, die höher ist, also wie sie sein sollte, wenn der Erfolg dieses Tuns von der Auffassung der Richtigkeit seiner einzelnen Teilstücke abhängig wäre. Die Genauigkeit des Tuns ist nicht eindeutig vorher bestimmt durch die Empfindlichkeit für Abweichungen seiner Teilstücke von dem erstrebten Erfolge. Es gibt Menschen, die ungeschickten, die ihre eigenen Fehler merken, sie aber in ihrem Tun nicht vermeiden können. Es gibt aber auch Menschen, die geschickten, deren zielgerichtetes Tun mit grösserer Genauigkeit abläuft, als es eigentlich auf Grund der Unterschiedsempfindlichkeit sein sollte.

Ich spreche in diesem Sinne von einer Eigengesetzlichkeit des Tuns, und vermute, dass die Einstellung auf das Ziel die Teilstücke eines solchen Aktes in ganzheitlicher Weise zusammenschliesst und hierdurch ihren Erfolg steigert. Allerdings scheint der Ablauf solcher ganzheitlicher Handlungszusammenhänge ziemlich erheblichen individuellen Schwankungen unterworfen. Während jene Elementarleistungen, die einst die klassische experimentelle Psychologie als psychophysische Konstanten bezeichnet hatte—wie die Unterschiedsempfindlichkeit und die einfache Reaktionszeit—bei allen normalen Menschen tatsächlich mit grosser Gleichmässigkeit wiederkehren, staunen wir immer von neuem über die unermessliche Spannweite zwischen den zusammengesetzten Leistungen, angfangen von dem Unterschiede des geschickten und ungeschickten Menschen bei jenen als Beispiele genannten Formen körperlichen Tuns bis hinauf zu der Haltung des Menschen gegenüber den verschiedenartigen Wertgebieten des Lebens. Diese Einsicht, dass nicht in den Elementarleistungen, sondern in dem ganzheitlichen Tun, also im "Können" oder "Nicht-Können," die eigentlichen Unterschiede der Menschen liegen, ist vielleicht dazu berufen, auch für die angewandte Psychologie, namentlich für die Eignungspsychologie, nützlich zu werden.

OTTO KLEMM. *Meaning and Symbolism in Psychology.*

Lange Zeit hindurch ist innerhalb der experimentellen Psychologie der Unterschied zwischen den sinn*haltigen* und den sinn*freien* Erlebnissen ausschliesslich im Gebiete der logischen Bedeutung beobachtet und gewürdigt worden. Die Erfüllung sprachlicher Zeichen mit einem logischen Sinn setzt sich nach oben hin fort in den Sinn übergeordneter solcher Einheiten: der Sinn eines Satzes ist in ähnlicher Weise jener Sinnerfüllung seiner Teile übergeordnet, wie selbst wiederum in den höheren Sinn von Satzfolgen einzumünden vermag.

Es hat sich uns nun als notwendig erwiesen, den sprachlich-begrifflichen Sinngebilden zahlreiche andere Formen von Sinnerfüllung zur Seite zu stellen. Wenn wir jemandem ein Teilstück einer Melodie vorspielen, und plötzlich abbrechen, so erlebt er einen über dieses Bruchstück hinausreichenden Drang, die Melodie zu vollenden. Er muss hierbei nur überhaupt für den Sinn einer Melodie empfänglich sein. Im Leipziger Institut ist diese Fragestellung mit Erfolg bei Musikalitätsprüfungen verwendet worden. Wenn eine rhythmische Reihe plötzlich abbricht oder fremde Teilstücke sich einmischen, oder auch nur die Pause ein wenig zu lang oder zu kurz ist, so kann uns dies ebenfalls als eine solche Sinnstörung zum Bewusstsein kommen.

Ähnliches spielt sich im Gebiet des motorischen ab. Es gibt alle möglichen Abstufungen zwischen sinnvollen und sinnarmen, ja schliesslich sinnlosen und sinnwidrigen Bewegungen unseres eigenen Körpers. In allen Formen edlerer Leibesübungen und in dem frei wachsenden Linienspiel des Sports, ebenso wie beim Tanz und mannigfaltigen Arbeitsbewegungen, finden wir solche Abläufe, die durch eine übergreifende Einheit zu einem Ganzen zusammengeschlossen sind.

Schliesslich eröffnet sich das gesamte Gebiet der optisch wahrgenommenen Gestalten mit ihren in verschiedenster Weise abgestuften Sinnerfüllungen. Wenn man nacheinander die sich mehr und mehr vervollständigenden Teile einer sinnvollen Zeichnung darbietet, so lassen sich experimentell die einzelnen Phasen der

Sinngebung von einander abgrenzen. Diese Sinngebung kann nach verschiedener Richtung hin gehen. Die ersten Elemente der Zeichnung werden meist nur in der Sphäre des geometrischen, des formal-ästhetischen sinnvoll gemacht. Sie werden verregelmässigt, werden gereiht, werden in Beziehung zur Umrahmung gesetzt. Dann kann bei zunehmender Fülle der Teile die neue Bedeutung plötzlich aufleuchten. Meist vollzieht sich dies mit lebhafter gefühlsmässiger Anteilnahme. Der Sinn wird dann gleichsam aus einem das Ganze noch umspannenden Gefühl herausgeboren. Jede Phase der Sinnwerdung ist gefühlsbestimmt, vom Gefühl geleitet.

Überall wo uns die Lücke in einem Zusammenhang zum Bewusstsein kommt, stossen wir auf solche bindende Kräfte des Ganzen. Die Freude des Kindes an dem geschlossenen Ganzen, etwa einem gefüllten Baukasten, ergänzt sich im Spiele dahin, dass etwas " verstecktes " oder " vermisstes " gesucht und gefunden werden soll, also etwas " leeres " auszufüllen ist. Über das kindliche Verhalten hinaus bleibt dies dem Erwachsenen treu.

Alles Sinnerleben ist Erleben von Zusammengehörigkeit zu einem Ganzen. Dass aber eine Gestalt einen Sinn annimmt, liegt an der Struktur der Seele, also an ihrem Aufbau, ihrem Gefüge, ihrem dispositionellen Einheitszusammenhange. Aus solcher ganzheitlicher Struktur quillt der Ganzheitsdrang, der ebensosehr die bindende Kraft für die Gestalt abgibt, wie er ihren inneren Zusammenhang zu einem Sinnerlebnis werden lässt.

OTTO KLINEBERG. *An Investigation of Psychological Differences between Racial and Environmental Groups in Europe.*

A series of psychological tests was administered to ten groups of boys in Europe, each group consisting of one hundred boys between the ages of ten and twelve years. These ten groups were (a) three city groups, in Paris, Hamburg, and Rome, and (b) seven country groups,—a German Nordic group in Hanover, a German Alpine group in the Black Forest in Baden, a French Nordic group in French Flanders, a French Alpine group in Auvergne, a French Mediterranean group in Southern France

near the Spanish border, an Italian Alpine group in Piedmont, and an Italian Mediterranean group in Sicily. The city groups were, as far as possible, unselected city-born children; the country groups consisted in each case only of such subjects as showed the anthropological characteristics accepted as distinctive for the Nordic, Alpine and Mediterranean subraces, respectively.

The tests used covered a fairly wide range of psychological activities, but the results here reported apply only to 'general intelligence' as measured by a series of six performance tests included in the Pintner-Paterson Performance Scale.

Results.

1. The ten groups in order of merit are: Paris, Hamburg, Rome, German Nordic, French Mediterranean, German Alpine, Italian Alpine, French Alpine, French Nordic, Italian Mediterranean.
2. Between the three city groups the differences are small and unreliable.
3. There is an almost reliable difference between the poorest city group and the best country group (the chances are 98 in 100 that there is a true difference greater than zero).
4. When the groups are combined so as to make comparisons possible between city and country, between the various racial groups, and between the various national groups, by far the largest and most reliable difference is between the city and country groups.
5. As between the three racial groups, the order is indeed Nordic, Alpine and Mediterranean, but the differences between these three groups are small and unreliable.
6. There are definite national differences, the difference between the German country group on the one hand and the French and Italian country groups, on the other, being almost perfectly reliable.
7. There is a marked difference between different samples of the same race; for example, between French and Italian Mediterraneans, and between German and French Nordics.

8. There is also a marked difference between different samples of the same nation, for example, between Italian Alpines and Italian Mediterraneans, and between French Mediterraneans and French Nordics.

It is pointed out that these results, in so far as they concern the differences between German, French and Italian groups, are in complete harmony with those obtained by the Army testers and other investigators in this country, but that a racial interpretation is by no means substantiated. Results 4 and 7 above seem to lend support to an environmental rather than a racial explanation.

HEINRICH KLÜVER. *The Importance of Mescal for Research.*

The report is a statement of experimental problems in which mescal may be used as a research tool.

HEINRICH KLÜVER. *Do Personality Types Exist?*

The paper is an analysis of the problems involved in the definition and experimental verification of 'types.'

HEINRICH KLÜVER. *The Equivalence of Stimuli in Monkeys.*

In a series of experiments carried on over a period of two years it was found that monkeys (different species), trained to react to certain relations in the perceptual field such as 'brighter than,' 'larger than,' 'heavier than,' 'faster than,' *etc.,* would react to the same relations if the *relata,* the stimulus objects, were changed. Thus in the case of each relation of the foregoing kind a group of equivalent (and non-equivalent) stimuli was determined. For each relation there were only certain objects which under certain conditions could serve as *relata.* In other words, the number of stimuli capable of being *relata* for a given perceptual relation was more or less limited.

Great difficulties arise in the attempt to characterize psychologically a group of equivalent stimuli. A fruitful analysis of behavior, however, is not possible without venturing an hypothesis concerning 'psychological equivalence.' In formulating such an hypothesis we are guided (1) by the fact that certain perceptual relations are reacted to with a certain ease (analysis of learning-curves); (2) by the number of *relata* found to be equivalent with respect to a certain relation; (3) by an analysis of the behavior of the animal while reacting to the different *relata* in a group of equivalent stimuli; and (4) by a phenomenological analysis of the groups of equivalent and non-equivalent stimuli. The theory presented is considered in its bearing on Köhler's *Strukturfunktionen.*

HEINRICH KLÜVER. *Fragmentary Eidetic Images.*

1. There are eidetic images which in a spatio-temporal respect display a certain 'fragmentary' character. The investigation of these fragmentary eidetic images must be considered of special theoretical interest, no matter whether the eidetic image is viewed as a problem in the field of visual perception or as one of the 'optical stigmata' in the sense of W. Jaensch.

2. The experimental analysis of fragmentary eidetic images shows: (a) that these images consist of fragments the appearance and disappearance of which it is difficult to explain by recourse to psychological factors; (b) that they represent discontiguous parts of the stimulus object in a way which constitutes a splitting-up into 'meaningless' detail; (c) that they possess many characteristics which differ markedly from the characteristics of the stimulus object, and (d) that they have characteristics neither found in nor suggested by the stimulus.

3. On the whole, it does not seem possible to explain the behavior of these fragmentary eidetic images by reference to certain properties of the stimulus (size, color, pattern, *etc.*) or by subjective factors (interest, attention, *etc.*).

4. It seems possible to throw some light on the genesis of these phenomena by recourse to the pathology of vision. Whether or not the factor of discontinuity as observed in pathological cases by Pötzl, Redlich, Stauffenberg, Head, Poppelreuter, Pick and others points to more than a similarity in a phenomenological

respect, if viewed in its bearing on the discontinuity in eidetic images, cannot be decided at present.

5. Brief mention is made of some of the chief results arrived at in a three-year-study of the eidetic disposition in different races and in different districts in America (California, New York City, West Virginia, Ohio, Louisiana).

F. B. KNIGHT. *A Study of Learning in the Case of Young Children.*

The investigations reported deal with the number of specific practice trials needed by typical second and third grade children to master the one-hundred-basic-addition, the one-hundred-basic-subtraction, and the one-hundred-basic-multiplication combinations. A group of twenty-five children, concerning whom much information of a psychological nature was available, learned the above mental functions under controlled conditions which approximated normal class-room situations. Exact tabulations were kept of all practice trials, both correct and incorrect. Speed of responses was recorded by means of a kymograph. Organization of the resulting data yields information relative to the varying difficulties of the three hundred combinations involved in terms of 'learning' experiences. All previous estimates of difficulty of combinations have been based on relative frequency of error on the part of upper grade children, whose distribution of practice on each combination is not known and cannot be even convincingly estimated.

The learning data have been treated for internal consistency when different measures of difficulty were used. The series of consistently high intercorrelations warrants considerable confidence in their worth. The findings seriously disagree with difficulty rankings based on frequency of error of upper grade children, which have hitherto been the basis for many crucial decisions of class-room technology. The whole problem of difficulty in terms of actual amounts of practice needed for mastery is crucial, since every child must indulge in some distribution of practice.

Daniel C. Knowlton and J. W. Tilton. *The Contribution of Ten Chronicles-of-America Photoplays to Seventh-Grade History Teaching.*

The photoplays were used in teaching six seventh-grade social studies classes during a six months' period. This experimental group was compared, in respect to learning, retention, and interest, with a control group of six classes in the same school taught by the same teachers. The experimental group was so selected as to be slightly less capable than the control group, so that differences favoring the experimental group could not be attributed to group-differences in ability to learn.

The photoplays were shown in the regular class-rooms in the regular history periods. The teachers used the same methods in teaching their control and experimental classes. The comparison was between reading and oral teaching, on the one hand, and, on the other hand, the same amount of time, four-fifths spent in reading and oral teaching as usual and the other fifth spent in seeing. Close control of the time factor was possible because all studying was done in the regular history period under the teacher's direction.

The tests used were constructed for the purpose by D. C. Knowlton. They were submitted to five capable judges for an evaluation of the worth of the knowledge called for. In order to permit a determination of the extent to which the knowledge called for is commonly possessed by teachers, they were given to ten public-school teachers who had not seen the photoplays. In the opinion of a majority of the judges, 385 of the 395 items called for worth-while knowledge. A majority of the teachers answered correctly 292 of the 395 items. It is evident from these facts that the tests could not have called for petty details, peculiar to the photoplays, to any great extent. Results are reported upon the whole test of 395 items, but as a matter of fact, it was found after using all items, that, when the 'poor' items were not scored, the contribution of the photoplays was larger than with them included.

The pupils who saw the photoplays learned 19% more and remembered about 12% more. They participated in the classroom discussions more voluntarily and 10% more often, and they voluntarily read 40% more supplementary history reading material. The contribution of the photoplays to teaching was of such a magnitude that pupils of average ability learned as much with the photoplays as bright pupils learned without them.

HELEN LOIS KOCH. *The Relation between Some Modes of Presenting Material and Efficiency in Memorizing.*

The purpose of the experiment was to discover the relationship between the relative efficacy of some modes of exposing material to be memorized and the following variables: (1) the nature of the recording response, (2) the criterion of efficiency used, (3) the stage of the learning at which the measurements of accomplishment are taken in the case of a given unit, and (4) the degree of the subject's familiarity with the exposure method.

Among the 7 different types of presentation employed, besides the more usual ones such as the so-called simple visual, the simple auditory, and the simultaneous combination of these, were some which might be described as successive combinations. In the latter the auditory and visual presentations were alternated in one- and two-trial sequences. Lists of 12 nonsense syllables were the units of material to be mastered; and the general procedure of memorizing was the anticipation procedure first employed by Finkenbinder. The criteria of efficiency considered were: (1) the total number of trials necessary to accomplish one successful anticipation of a unit of material, (2) the total number of errors made during the learning trials, and (3) the number of letters correctly anticipated in each trial. The types of recording response whose effects were investigated were the vocimotor and manumotor. Fourteen young women—all college students—served as subjects. The averages for each exposure condition, since each subject mastered 3 units of material under each of the 14 conditions, are based upon 42 measures.

The relative efficacy of the various exposure methods seems to be a function of each of the variables listed in the initial paragraph. The simultaneous combination of the visual and auditory presentations tended, however, to be rather uniformly the most effective; the simple auditory, the least. The simple visual and the alternating combination methods, which were inclined to maintain a position between the two methods just enumerated, showed with respect to each other few consistent superiority-inferiority relationships. Varying the size of the alternation unit from one to two trials seems to have had no conspicuous effect upon the speed or the accuracy of the learning. Recording responses of a vocimotor sort tended to beget better results than manumotor ones.

The data of the experiment have a bearing on the theoretical problem of the nature of mental set and the factors operative in determining the effects of shifting from one set to another.

WOLFGANG KÖHLER. *The Development of Physiological Hypotheses as Basic for Experimentation.*

Wenn der Psychologe sich nicht auf die Beschreibung von Zuständen und Hergängen beschränken, sondern ihr Zustandekommen begreifen will, so muss er dabei über das unmittelbar Erfahrene hinausgehen. Denn im aktuellen Bewusstseinsfeld kommt nur ein Teilgebiet derjenigen funktionellen Zusammenhänge direkt zum Ausdruck, in deren Gesamtheit sich die Beschaffenheit und die Änderungen jenes Feldes bestimmen. Die einfachste Annahme über den weiteren Zusammenhang ist die, dass es sich um ausgedehnte physiologische Dynamik handelt, von der ein Teilgebiet von Bewusstseinserscheinungen begleitet ist.

Die gegenwärtige Physiologie beschäftigt sich nicht viel mit diesen wesentlich zentralen Hergängen. Material für ihre Erforschung können uns liefern: psychologische Feststellungen in den beiden Formen der phänomenologischen Beschreibung und des Leistungsexperimentes, ausserdem unsere Kenntnis überhaupt vorkommender physischer Hergangsformen und wenigstens etwas vorhandenes Wissen vom nervösen Medium und den gerade dort möglichen Prozessarten. Sobald Beschreibung oder Leistungsexperiment uns vor ein funktionelles Problem stellen,

werden wir zugrundeliegende Hergangsformen zu erschliessen suchen, deren Beschaffenheit der Beschaffenheit des vorliegenden Problems entspricht, und die zugleich nach allgemeinen dynamischen Gesichtspunkten wie nach unserer Kenntnis des nervösen Milieus in diesem auftreten könnten.

Solch eine Hypothesenbildung hat, z. B. in der Physik, von jeher stattgefunden, wo beobachtete Erscheinungen offenbar auf nicht direkt beobachteten Prozessformen beruhten. Und niemals hat man die Hypothesen für wertlos gehalten, weil eine direkte Verifikation in den meisten Fällen nicht sofort vorgenommen werden konnte. Jede konkrete Hypothese enthält mehr als eine Abbildung der gerade zu erklärenden Erscheinungen in funktioneller Ausdrucksweise. Sie wird uns zwingen, gewisse Folgerungen zu ziehen, die über den Inhalt der zu erklärenden Beobachtung hinausgehen. Ist die Hypothese zutreffend, so haben wir—im psychologischen Fall—unter bestimmten Bedingungen neue phänomenologische Befunde oder bestimmte Ergebnisse von Leistungsexperimenten zu erwarten. Bestätigt sich unsere Erwartung, so muss etwas von dem Charakter der Hypothese zutreffend gewesen sein. Finden wir unsere Voraussage nicht bestätigt, so wissen wir, dass wir eine neue Hypothese zu machen haben, für welche nun der Spielraum eingeengt ist.

Dies ist geradezu *das* Vorgehen der experimentellen Wissenschaften. Es muss in einer jungen Wissenschaft zuerst unsicher sein. Wenn man aber auf die Frühzeit der physikalischen Forschung zurückblickt, so findet man, dass auch dort grosse Unsicherheit der Hypothesenbildung dem jetzigen Zustand vorausgegangen ist. Je eher der Psychologe das betreffende Vorgehen als massgebend für seine junge Wissenschaft erkennt, um so besser. Sind die physiologischen Hergänge, die in direkter Erfahrung zum Ausdruck kommen, unselbständige Hergänge in grösseren physiologischen Zusammenhängen, so kann es kaum einen anderen Weg zum funktionellen Verstehen geben.

Es muss betont werden, dass Empfehlung dieses Vorgehens alles andere als eine Zurücksetzung der phänomenologischen Beobachtung oder des psychologischen Leistungsexperimentes bedeutet. Diese geben ja fortwährend die Basis und die Hauptkontrolle für das ganze Verfahren ab, sie machen es überhaupt möglich. Ebensowenig wird Rückkehr zu jenem Primat bestimmter physiologischer Voraussetzungen über die Psychologie empfohlen, unter dem die Psychologie früher zu leiden hatte. Damals bestand Gefahr, dass solche Voraussetzungen darüber entschieden, welche psychologischen Befunde anerkannt und welche irgendwie beiseitegeschoben werden sollten. Auf dem empfohlenen Wege werden wir gerade zu einer Erweiterung unseres physiologischen Denkens veranlasst, die die Lage der allgemeinen Biologie ohnehin erfordert. Denn Phänomenologie und Leistungsexperiment führen uns dazu, immer weniger anatomische Einrichtungen von Maschinencharakter und Aggregate von selbständigen Elementarprozessen als entscheidende funktionelle Begriffe zu verwenden. Ausgedehnte funktionelle Prozessganze in Selbstverteilung, relative Aussonderung von Untereinheiten in ihnen, bestimmung von Teilprozessen im Ganzfeld usw. sind die viel mehr *dynamischen* Vorstellungen, mit denen wir operieren müssen, wenn unsere Ideen über den Totalzusammenhang dem entsprechen sollen, was psychologische Beobachtung uns im engeren Bereich direkt erkennen lässt.

WOLFGANG KÖHLER. *Ueber einige Gestaltprobleme.*

Die Diskussion der letzten Jahre dürfte den Begriff sensorischer Gestaltung gesichert haben. Eine prinzipiell empiristische Erklärung der betreffenden Tatbestände ist ausgeschlossen. Dann aber muss es eine sensorische Dynamik im physiologischen Sinne geben, auf der die Gestaltung unserer Wahrnehmung beruht. Da die Wissenschaft darauf ausgeht, nach Möglichkeit *einen* systematischen Zusammenhang für alle Erfahrungsgebiete zu finden, so versuchen wir, eine solche Dynamik gemäss physikalischen Grundvorstellungen zu entwickeln. Dies Bestreben wird ermutigt durch die neueste Wendung der Physik, in der sich an Stelle der früheren stückhaften Betrachtung schnell ein konsequent gestaltmässiges Denken durchsetzt.

Ein zweites Gebiet, in dem Methoden und Ergebnisse schon wesentliche Entscheidungen erlauben, ist das der Gedächtnisforschung. Aus den Eigenschaften sogenannter Assoziationsbildung scheint zu folgen, dass man den Begriff der Assoziation auf den der Gestaltung oder Organisation zurückführen kann. Eine Assoziation dürfte nur dort bestehen oder zustandekommen, wo die ursprünglichen Erlebnisse oder Prozesse einem Gestaltzusammenhang angehören oder in einen solchen gebracht werden. Es liegt also nahe anzunehmen, dass die spezifische funktionelle Verbindung (Assoziation), auf der die Reproduktion eines B durch ein A beruht, mit der Einheit der physischen Spur identisch ist, welche der Ganzprozess A B im Nervensystem zurückgelassen hat. Diese Annahme ist zu prüfen dadurch, dass ihr zufolge Gesetze der Gestaltung zugleich Gesetze der Assoziation sein müssen.

Kontinuitätsgründe erfordern noch eine andre Erweiterung der "sensorischen Felddynamik." Das eigene Ich als aktuelles Erfahrungsgebilde muss auf einem Ganzen von Prozessen in demselben Hirnfeld-Zusammenhang beruhen, in dem andere Prozesse der anschaulichen Umwelt entsprechen. Gerichtete Verhaltensweisen des Ich gegenüber Bestandteilen der Umgebung finden dann ihre Basis in gerichteten Feldzuständen zwischen dem Prozessganzen, das dem Ich, und den Prozesskomplexen, die den betreffenden Umgebungsbestandteilen zu Grunde liegen. Die Ichprozesse hängen wesentlich von den wechselnden inneren Zuständen des Organismus ab. Es ergibt sich eine erweiterte Dynamik, welche von den entsprechenden Beschaffenheiten der Ichprozesse in ihrem Verhältnis zu der Natur der jeweiligen Umgebungsprozesse bestimmt wird. Nach dieser Vorstellung steuern die im Hirnfeld zwischen Ichprozess und Umgebungsprozessen gegebenen Spannkräfte das äussere Verhalten des Organismus. Der Körper erhält solche Innervationen, dass die dadurch erreichten Prozessverschiebungen im Hirnfeld den Ausgleich vorher bestehender Spannungen im Felde bedeuten.

Dies Grundschema bedarf der Vervollständigung vor allem darin, dass zunächst Vorstellen, Denken usw. vernachlässigt sind. Die Einbeziehung dieser Vorgänge wird jedoch in einer Hinsicht

kaum eine prinzipielle Diskontinuität mit sich bringen: der Denkende und Vorstellende hat die Gegenstände seiner Operationen wiederum wie in einem Umfeld vor sich.

A. W. Kornhauser. *The Study of Work-Feelings.*

The discussion covers the following topics:

Comparative neglect of studies of feelings and attitudes in work; reasons; actual importance, practical and theoretical.

The gap between laboratory studies and industry in such matters.

Brief evaluation of laboratory studies.

Industrial studies: promising lines and possibilities, with special reference to the question whether industrial studies can hope to be scientific or to reach beyond particularistic and practical 'understandings'; the task of 'wedding hypothesis and data.'

A. W. Kornhauser. *Instincts in Industrial Psychology.*

A study of motives is an inquiry into those particular facts which help account for given conduct in terms of the inner controls or 'purposes' involved. The view defended in the present paper is that discussions about instinct represent almost the only serious attempt to deal concretely with the problems of complex 'purposive' conduct, and that we can advantageously employ *instincts* as tentative guiding views in our attempts to understand particular activities—provided we unceasingly recognize that the instinct categories are valuable only as they suggest inquiries into particular causal events and as they serve to summarize the factual evidence in regard to given conduct. Actually there is slight difference between a sound methodological instinct view and an anti-instinct approach. We see no effective argument against accepting *instincts* as a respectable view of motivation—with full awareness, however, that the view is tentative, that any classification will need extensive revision as knowledge accumulates, and above all that *instincts* are never solutions to questions of motivation but only guiding concepts which help in the search for differential explanations.

N. Kostyleff. *Further Progress Accomplished by Reflexology.*

W. Bechterew has left a work which is too little known and yet is of the greatest interest, as it opens a new way to scientific progress in psychology. This is due to the fact that in his *Treatise of Human Reflexology* he has passed from the conditioned reflexes of the Pavlov school, which are produced artificially, to those which one might call natural, as we find them formed by nature in every one of our psychic functions: in language, in thinking and even in the mechanism of our perceptions.

As regards the last he has confirmed the conclusions drawn by the writer from the physiological study of vision tending to prove that neither the distance of the objects nor their size nor even their form is perceived directly, but that these perceptions depend on the association of the retinal excitability with the motor reflexes of the eye, of the hand and of the whole body of the individual. Here the association is so obscure and of such an early date that it can be discovered only in some pathological cases, namely in the perceptions of people born blind and afterward operated on for cataract. He discovered much more easily the part of the condition reflexes in the education of other senses which do not attain such a degree of fusion, and also in the formation of language where it is still more apparent. In the act of thinking he met with another great difficulty, for in most cases, where thought remains without verbal discharge, the inhibition of the reflex is followed by a further development of its central phase, the laws of which are still unknown. He could only indicate the way in which this process must be studied. However, from that moment the study of conditioned reflexes acquired quite a different meaning from that in the Pavlov school. It was no longer reduced to the limits of a singular case where psychic data appeared accidentally connected with physical factors. The various modalities of the conditioned reflex appeared as being the basis of the natural phenomena which form the whole of our psychic life: their establishment lay at the basis of memory, their extinction at the basis of the unconscious, their inhibition at the basis of thinking. The importance of this discovery needs no comment and nothing seems more urgent for further scientific progress in psychology than a closer study of this work and its translation into foreign languages.

N. I. Krasnogorski. *The Biological Investigation of Cerebral Activity in Children.*

In 1907, inspired by the remarkable experiments of Professor I. P. Pavlov on animals, we began the biological investigation of cerebral activity in children by the method of conditioned reflexes. For this purpose we have built special laboratories and have worked out a motor-secretory method (secretion from one or both parotid or submaxillary glands, and the tonic reflex of the opening of the mouth and the natural act of grasping the food).

Results. The conditioned reflexes, both positive and negative (inhibitory), are functions of the cerebral cortex. This is proved by the following facts: (1) the conditioned reflexes may greatly vary in their intensity while the unconditioned ones (subcortical) remain constant, and (2) the more the cerebral cortex is organically affected, the more the conditioned-reflex activity is pathologically changed.

Whole chains of conditioned reflexes could be formed in normal children, by connecting external stimuli with one another before one of them had coincided with an unconditioned reflex.

The newly formed positive or negative conditioned reflex has a certain sphere of generalization; its degree depends essentially upon the age and the functional structure of the analyzers. In defective children generalization may be extremely wide.

Experiments with starving and unbalanced overfeeding have shown that the course of a conditioned reflex depends upon the excitability of the corresponding subcortical center.

The cortical inhibitory reflexes in normal children are characterized by a high speed of formation, extreme force of action and high specificity; they really are great and powerful regulators of the instinctive (food, sexual, motor, *etc.*) activities in man and the chief physiological mechanisms of his social adjustment.

Every conditioned positive or negative stimulation produces in the cerebral cortex an excitatory or inhibitory process, which irradiates over the cortex and then begins to concentrate in its point of origin. The concentration lasts much longer (minutes) than the irradiation (seconds). In infants irradiation is wider and concentration slower than in older children. High speed of concentration is an indicator of perfect functioning of the cortical cells.

The cerebral cells of a normal child with optimal subcortical excitability respond to strong external conditioned stimuli by more intense reflexes than to weak ones. However, if the optimal cortical or subcortical excitability is changed, the children begin to react otherwise. In this case weak and strong stimuli produce the same effect, either equally strong (leveling excitatory phase), or equally weak (leveling inhibitory phase); or weak stimuli may even produce a greater effect than stronger ones (paradoxical phase). In normal children the above-mentioned phases are transient, but in pathological cases they may acquire a permanent character. The paradoxical way of reacting is an indication of weakness of the cerebral cells and is often observed in infants. The fundamental symptoms of hysteria are based on this paradoxical way of reacting.

PAUL J. KRUSE. *Inhibition in Relation to the Elimination of Maladaptive Responses.*

During the past year and a half considerable work has been done on the unconditioned and conditioned salivary responses in man. Findings relating to inhibition seem most challenging and promising, particularly because of their bearing on the problem of elimination of maladaptive responses.

By measuring the parotid secretion for successive periods under constant unreinforced stimulation the change from a positive to a negative response may be shown. Under the name of 'experimental extinction' many examples of this type of adaptation in the behavior of dogs have been shown by Pavlov. This paper presents data resulting from the application of this technique to an adult male subject. A natural conditioned stimulus, food placed before the subject, was used instead of an artificial conditioned stimulus, because it represents a firmly established response, and because it avoids the charge of artificiality sometimes made against the data of the conditioned reflex. The subject was in a state of hunger for each test and had been eating his luncheon under the conditions of the experiment for a protracted period.

The control reaction shows the amount of saliva being secreted when the subject is seated quietly without food as a part of the situation. In the next minute food is placed on the table and a 300 per cent increase in saliva is registered. The quantity obtained for successive minutes of continued stimulation thereafter without reinforcement (without eating) shows a progressive decrease. This is accompanied by a gradual increase in the latent period of the reaction. The food, now no longer eaten when seen, loses its biological significance as a signaling agent and the organism quickly adjusts itself to the new state of affairs.

During the second control period all food was removed from sight for one minute and when it was replaced in the next period the response was partially restored. The rest period served to release the inhibition that was developing by continued unreinforced stimulation. Continued stimulation by the food caused a reinstatement of the inhibitory state with the characteristic release following each rest period until inhibition became firmly established. A stimulus to a positive conditioned response has, under the conditions of this experiment, been transformed into a stimulus for a negative or inhibitory conditioned response. This transition is seen to be fairly rapid and progressive. The positive response or habit was eliminated by the continuation of a stimulus whose biological significance to the organism had changed.

These findings appear to be very promising and to point toward the solution of the problem of the elimination of the maladaptive response without going beyond the principles involved in fixing the adaptive response.

Fred Kuhlmann. *The Universal Scale.*

The results of measurements of intelligence are being applied in increasing volume to subjects ranging in age from infancy to middle age. This application is seriously handicapped by the absence of a universal scale, into the units of which any and all psychometric test results can be transmuted at all ages, and which gives a constant score to the individual whose relative position in the group to which he belongs remains constant.

Final scores in practically all test scales are cast in terms of performance at different age levels. Practically all fall into one or two classes: first, those that score in terms of mental age and intelligence quotients, and secondly, those that score in terms of some measure of variability, which may or may not be transmuted further into percentile scores, or mental ages and intelligence quotients.

Both types of scales meet difficulties arising from differences in the subjects measured. Races may differ (a) as to the final average level of development; (b) as to the age at which this level is reached. There are probably similar sex differences, not yet determined. Individuals reaching different final levels probably do not reach these at the same age.

Scales scoring in terms of M.A. and IQ do not provide for scoring adults above the average level, without special devices that involve more or less questionable assumptions. Also, the IQ for a given individual remains constant at different ages only if that individual is an exact average for the race, and perhaps sex to which he belongs. These scales, however, have an important advantage in ease of obtaining accurate norms. Due to selective factors operative at different ages in the obtainable age-groups of subjects, these age-norms might possibly be improved by using modes in place of averages or medians.

Scales that score in terms of measures of variability involve unproven and perhaps untenable assumptions regarding the nature of the distribution of grades or degrees of intelligence. They meet insurmountable difficulties in establishing accurate norms. They require a whole norm scale at each age, where the other type requires only an average. In any such norm scale at any age, those values representing levels much above or below the average in the distribution are based on too small numbers of subjects, even when the total number of subjects used runs into many thousands. It also always involves the necessary assumption that the brightest and dullest found represent the brightest and dullest existing or possible. This type of scale offers no hope of improvement to a satisfactory degree.

Recent successes in deriving a mathematical formula for the mental-growth curve that satisfies the facts as found by mental tests, such as given by Heinis, give renewed promise for a universal scale. Heinis' growth curve gives true constants for the tests and data used, thus correcting the main fault of the IQ scoring scales, and age scores from any tests may be transmuted directly into Heinis' growth curve units.

GRACE A. DE LAGUNA. *Perception and Language.*

It may be assumed that there is a general correlation between the range of perceptual content and the behavior system of an organism. The only possible test as to whether a given feature of the environment is perceived is to determine whether it is discriminated in the responses of the organism. The application of this principle is, however, attended with the greatest difficulties. It cannot be concluded, for example, that because the addition of M to a given stimulus brings about a determinate variation in response, M itself is perceived. We can infer only that the perceptual whole is different. In short, the correlation which must be postulated between perceptual content and behavior is a correspondence of *patterning, i.e.* of functional systems.

If we accept this postulate, it follows that the ability to speak carries with it a profound alteration in the type of perceptual content. If the animal cannot tell us what he sees, then what he sees is essentially indescribable. Speech is not a form of behavior which is merely superimposed on a preëxistent system of primary behavior. On the contrary, it is bound up with the primary behavior both genetically and functionally in the most intimate way. The primary system of a speaking animal is characteristically different both in range and organization from the behavior system of an animal incapable of speech.

Regarded simply as a form of discriminatory response, speech differs radically from all other forms of behavior. It provides a means of responding specifically and directly not only to objects and acts as such, but also to qualities and relations. Even the gesture of pointing cannot discriminate an object from its spatial location. One cannot point to a color or to a temporal succession. But language is far from being a set of discrete responses. A language is a systematic whole. If speech is unique as a means of analysis, it is also unique as a means of organization. Consequently the characteristic structure of language must appear in the world as perceived.

It is doubtless true that much of human experience remains unverbalized, and that there are aspects of it which are indescribable. There are distinct levels of human perception. What we observe in order to report or describe in language is characteristically different from what we perceive merely as something to be avoided or followed or picked up. Yet even this unverbalized experience is such that it may *become* verbalized; and this is itself a characteristic profoundly distinctive of human experience. Even when the ' figures ' of our perceptual configurations themselves exhibit no determinate language-structure, they are experienced against a ' ground ' which is in some measure linguistically determined.

Carney Landis. *The Psychogalvanic Reflex Compared to Other Measures or Criteria of Emotion.*

Over 100 boys (aged 10 to 16) were subjected to the following experimental routine. Each worked forty minutes on a Weiss-Renshaw pursuit-meter. Postural bodily movements during this period were recorded by means of a stabilimeter. The psychogalvanic reflex (Godefroy method) was taken from the idle hand during the same period. Subsequently these subjects were given the Pressey X-O test of emotionality, the Almack test of the sense of humor, a modified Allport A-S test, and a personality questionnaire.

Statistical treatment of these data showed little or no correlation between any two of the measures used. This is essentially what would be expected, since the various reactions classified under the general term emotion are much too diverse to show any general relationship in a group of ' normal ' individuals.

The psychogalvanic reflex—supposedly an indicator of emotion or conation—appeared in this experiment in quite a random fashion. Its appearance or non-appearance was quite unpredictable from the behavior or activity of the subject. Overt activity which would be called grief, anger, suffering, determination, fear, *etc.,* were all unmarked by any unusual psychogalvanic reactions. On the other hand, the reflex appeared when the subject was quiet, when disturbed, when trying or not trying to work.

The conclusion to be drawn is that the reflex under the conditions of this experiment represents a local skin-reaction of the nature of an internal physiological adjustment which may or may not have a clearly defined psychological component.

According to current opinion the autonomic nervous system functions in a segmental fashion, that is to say, the cranial, sympathetic, or sacral division functions as a unit. The psychogalvanic reflex has been shown to be under the control of the autonomic nervous system. Its appearance or non-appearance bears little or no relation to other evidences of autonomic function. Crying, acute visceral pain, flushing, and sweating occurred without the appearance of the reflex. The explanation probably lies in the fact that the autonomic system is segmental in control of major visceral activities but that at the periphery its action is more or less localized.

Carney Landis. *The Place of Emotion in Personality.*

Almost without exception physiological, motor, biochemical, and psychological tests of emotionality have given results of small practical value. A certain low, but fairly constant, tendency of agreement between the tests has been noted. This seems to indicate that some common element is in operation but that it is concealed either by the multiplicity of factors operating or by the crudeness of the testing methods.

Physiologically it is doubtful if an entity which might be termed emotion exists. Psychologically and socially the weight of evidence indicates its existence.

HERBERT S. LANGFELD. *The Nature of Appreciation in Aesthetics.*

The most frequent term to describe the state of aesthetic contemplation is detachment, a term which is vaguely suggestive of the truth but which, from its very definition, is apt to be misleading. It is likely to be interpreted as meaning a kind of rarefied or quasi-spiritual state of mind, when in reality the aesthetic attitude is far from being such a trance-like mood. Analysis shows us that the aesthetic attitude is one in which we are detached from the world only in the sense that our response is determined solely by the purpose and intention of the artist. It is true that our imagination is usually aroused, but it, too, should be bound by the form and meaning of the work of art before us. When we build castles in Spain while listening to Beethoven's *Ninth Symphony,* we cannot be considered to be in a state of aesthetic contemplation. Further, detachment should not mean absence of desires and wishes. It is in explaining the place of such functions that one can well make use of the concept of psychic distance, which Mr. Bullough attempted to describe, but which he has badly confused with the aesthetic attitude itself. Psychic distance denotes the relation of the meaning of the object of contemplation to the experiences, ideals, and wishes of the contemplator. With these two concepts of aesthetic attitude and psychic distance, it seems possible to solve some of the vexing problems in aesthetics, as, for example, the conflict of emotion and intellect. A purely intellectual contemplation is the attitude of the critic. On the other hand, emotions, especially if strong, are likely to lead to action beyond the intent of the artist. Yet few persons would rule emotions out of the aesthetic experience. The answer seems to be that emotions are in place so long as the distance is great enough for a maintenance of the aesthetic attitude. Mr. Edmund, in a recent publication, has rightly stated that " in literature, even pain and distress may be experienced at arm's length and in the garb of beauty." Attitude and distance seem to make clear such literary metaphors. The effect of the lowering of distance in some of the recent movements in art, such as the presentation of Shakespeare's plays in modern settings and the addition of the speaking voice to the moving picture, may also be evaluated in the light of these concepts.

LYLE H. LANIER. *An Analysis of Thinking Reactions of White and Negro Children.*

This report is based upon results of testing some 500 twelve-year-old white and negro children in Nashville, Chicago, and New York with Peterson's Rational Learning Test. This test is well suited to analytical purposes, since it yields six different scores, in contrast with the single gross score commonly secured with standard tests. These six criteria are: the time required to learn the problem, the number of trials, the number of errors irrespective of kind, logical errors, perseverative errors, and rate of response.

Intercorrelations of these six factors for the two races reveal (1) that the relationships among the several factors are quite similar for the two races; (2) that the factors, time, trials, unclassified errors, and logical errors, are highly related; (3) that perseverative errors do not correlate nearly as closely with these first four factors as do the latter among themselves; and (4) that rate of response is practically unrelated to any of the other five factors. These correlations indicate that the test measures somewhat diverse aspects of the complex of factors involved in reacting to it, thus permitting relative isolation of such factors as speed, accuracy, and tendency to perseveration.

Although the whites in the three cities do not differ very markedly by the six criteria, the negroes in New York excel those in Chicago, while the latter, in turn, surpass the Nashville negroes. Whether these differences are due to better opportunities in New York as compared with Chicago, and in Chicago as compared with Nashville, or whether the differences are due to selective factors, cannot be asserted from present results. Both factors may operate and further study is needed.

On the whole the negroes seem relatively better (although actually inferior in Nashville and Chicago) by the trials, unclassified error and logical error criteria. New York negroes surpass the New York whites markedly on these three factors. The whites are relatively superior in time, perseverative errors, and rate of response. The speed factor is the one yielding the most decisive white superiority. Even in New York, where the negroes equal or surpass the whites by other criteria, the white speed advantage is very great. This may chance to be a real race difference.

. Skin-color ratings were made for Nashville and Chicago negroes. Correlations between these ratings and test scores were all low and unreliable. In New York, a composite percentile score based upon nose-width, lip-thickness, ear-height, and interpupillary span gave similar low, and even negative, correlations with the test factors. Negro performance on this test does not seem to be conditioned in any systematic manner by degree of white blood as thus estimated.

SELMER C. LARSON. *A Short Method for Solving Normal Equations.*

In working out the theory for the determination of weights in the regression equation, mathematicians deal with determinants almost entirely. Because of this, the method of solution which has been developed for normal equations is not different from that for simultaneous equations in general. The make-up of the normal equations, however, is strikingly different from that of ordinary simultaneous equations. If a line is drawn diagonally through the square moments of normal equations, we have two symmetrical triangles. For this reason it is possible to reduce the work by about one-third over the method usually employed. The reduction depends on the number of equations. The more equations there are, the greater the saving. If n equals the number of equations the reduction of work is $(n-1)/2(n+2)$. This formula includes the check column also.

In solving the set of equations always begin the elimination by comparing the upper equation with each one of the others in turn. The resulting set will also be symmetrical and so on until just one unknown remains. Since we have symmetry, only two-thirds, approximately, of the numbers need be written.

The proof is quite simple but cannot be given in this brief summary. The work can be shortened further by adopting certain techniques on the comptometer. In an accompanying table a problem of four unknowns is worked out and a very brief explanation given.

This method of solution is now being used by some at the University of Wisconsin and it saves much labor in solving multiple regression equations.

WILLIAM S. LARSON. *The Rôle of Musical Aptitude in an Instrumental Music Program in a Public School.*

The rapid growth of instrumental music in the public schools during the past fifteen years has been responsible for a problem of consequence, viz., the admittance of large numbers of the unmusical as well as the musical to instrumental music classes. A large percentage of discontinuances and failures has been the result. Great numbers of students are encouraged to register for instrumental instruction in order to enlarge the chances for a successful organization in the future. This necessarily entails great waste.

Musical aptitude tests have been developed in a comparatively recent time, and they should be of service in determining the musical talent of the instrumental student before training begins. In order to study the significance of these aptitude tests for this purpose, an investigation was made of the musical talent of a recognized instrumental department in a public school system, using Seashore's *Measures of Musical Talent.* It was found that the beginning instrumental classes rated about average in the various talents. A rise in the percentile averages was found at each higher level of attainment. The high school advanced orchestra, which later won the National High School Orchestra Contest, showed especially high ratings in these talent tests.

This rise in talent-scores at higher stages of achievement indicates a selection of talent. It bears out objectively the view that in a situation offering relatively equal opportunities for training, progress has been dependent upon specific talents for music. In the course of teaching an unselected and unclassified group of music pupils, the individual pupil rates his progress in comparison with that of the group. When once his attainments approach the limits as governed by his talents, it is not long before his interest lags. Those attaining membership in the highest musical organizations in a public-school system have survived a selection in process during several years.

Since the aptitude tests used in this investigation are relatively elemental in that scores do not improve to any appreciable degree with age and training, this rise in scores points to the feasibility of using these tests for the classification and guidance of talent. Group distributions of the various instrumental music organizations of the school system should be available so that scores of a prospective student may be compared in terms of these distributions. This would form a basis for predicting the chances of reaching certain levels of attainment. A survey of musical talent would facilitate this procedure in that it would make the scores of an applicant available at any time. It would also serve as a means of discovering the most talented pupils.

In addition to the value of musical aptitude tests for the selection of talent, the test scores may also be used as an aid in teaching. The teacher should recognize the student's natural capacities, and guide his activity accordingly. The orchestra and band offer a wide range of possibilities for this in both the choice of the instrument and the prominence of the part for the instrument.

K. S. LASHLEY. *Basic Neural Mechanisms in Behavior.*

Address of the President of the American Psychological Association.

See *Psychological Review,* 37, 1930, 1–24.

J. A. Levin. *New Methods of Testing School Attainments and Intelligence in the Practice of Leningrad Schools.*

The principal contents of this paper comprise an exposition of the results of an investigation of Leningrad school children, carried out by the Children Investigation Institute with tests in counting (ranging 10, 20, and 100), in speed and correctness of reading aloud, in intelligence (the Rossolimo group method and the Woody counting tests), in Stone's problem solving, in Ballard's reading comprehension, and in intelligence (Decroly, Dobi's[1] method).

The importance of the test method for the measurement of school attainments and of intelligence in the matter of school-work organization is expounded. The idea of a norm for variation (statistical point of view) is made clear, and the significance of the variability measures is explained.

Kurt Lewin. *Die Auswirkung von Umweltkräften.*

Bei der Kürze der Zeit möchte ich keine allgemeine Theorie, sondern ein einzelnes Beispiel erörtern und zwar ein Beispiel dafür, wie bei dem Zustandekommen eines Verhaltens die Feldkräfte und die besondere Topologie des psychischen Umfeldes zusammenwirken.

Die Tatsache, dass ein Gegenstand, der mich lockt, einen psychischen Vektor in der Richtung auf diesen Gegenstand hin erzeugt, ist in der Regel auch "zweckmässig." Denn Aktionen in dieser Richtung pflegen das tatsächliche Erreichen des Gegenstandes zu begünstigen.

Es gibt auch Fälle, wo die Topologie der Situation derart ist, dass das Erreichen des lockenden Gegenstandes durch die von ihm ausgehenden Feldkräfte geradezu *erschwert* wird. Der Film zeigt die Schwierigkeiten eines etwa 1½ jährigen Kindes, sich auf einen niedrigen Stein zu setzen. Die Schwierigkeit beruht darauf, dass das Kind sich umdrehen muss, um sich hinsetzen zu können. Es muss also eine Aktion ausführen, die der Richtung des Feld-Vektors entgegengerichtet ist. Der Film zeigt deutlich,

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[1] Dobi is a Russian abbreviation for the Children Investigation Institute in Leningrad.

wie sich die Anziehung in immer neuen Versuchen auswirkt, sich in *direkter* Aktion mit der Brust und dem Oberkörper auf dem Stein zu schieben. Einmal kommt es zut einem undeutlichen Verstehen, das so etwas wie eine Drehung um sich selbst notwendig ist.

Auch die Schwierigkeit, von einer umgekippten Wanne, auf die das Kind geklettert ist, wieder herunter zu steigen, beruht auf einem analogen Gegensatz zwischen der Richtung des Feld-Vektors und der notwendigen Aktion.

Die innere Spannung bei dem Versuch, sich auf den Stein zu setzen, führt zu typischen *Unruhehandlungen,* deren spezielle Form wiederum unmittelbar mit der besonderen Topologie des Feldes zusammenhängt. Die Art der Unruhehandlung in derartigen Situationen ist allgemein von der Form der *Barriere* abhängig, die die Person von dem lockenden Gegenstand trennt. Es besteht die Tendenz, ein Grösserwerden der psychischen Entfernung vom Aufforderungscharakter möglichst zu vermeiden. Die Unruhehandlung vollzieht sich (falls ein Näherkommen nicht möglich ist) daher möglichst *senkrecht zur Richtung der Feld-Vektoren.* In unserem Falle ergibt sich infolgedessen ein Kreisen um den Stein.

Diese Auffassung lässt sich durch einen Versuch, der in einem 2. Film demonstriert wird, bestätigen. Um einen Turm aus Bauklötzen ist eine kreisförmige eiserne Barriere gezogen. Wiederum nehmen die Unruhehandlungen des 1½ jährigen Kindes, das zu den Bauklötzen gelangen will, die Form des Kreisens an.

Man kann zeigen, dass das Kind dabei nicht etwa durch die kreisrunde Form der Barriere zum Kreisen veranlasst wird: stellt man das Kind in den Ring und den lockenden Gegenstand nach aussen, so würde ein Kreisen nicht mehr der Richtung " senkrecht zu den Feldkräften " entsprechen. In der Tat unterbleibt dann das Kreisen.

Einige Einzelheiten der Aktion des Kindes, insbesondere die Zuwendung zur Mutter als eines möglichen Weges durch die Schwierigkeitsbarriere, zeigen zugleich, dass bei der Untersuchung der Topologie eines psychischen Feldes neben den

physikalisch-geographischen die *sozialen* Momente der Situation voll in Rechnung zu stellen sind.

H. S. Liddell. *The Conditioned Reflex Method in Experimental Psychology.*

The controversy aroused by the introduction of the conditioned reflex method into psychology may be attributed largely to an erroneous interpretation of conditioned reflex action. The reflexes evoked from a spinal animal are real fractions of the normal animal's activity in adjusting itself to a changing environment. These simple responses are measurable in quantitative terms and are, therefore, convenient objects of study for those physiologists who are preoccupied with the task of quantitative description of living processes. The adaptive aspect of the simple reflex can often be ignored. On the other hand, it will be shown that the *conditioned* reflex is not a fraction of behavior, as the word reflex suggests, but a complete and precise act of adjustment. It differs in no fundamental respect from an ordinary habit and its formation is a case of ordinary learning. Since the concept of the conditioned reflex was formulated by Pavlov in the course of physiological investigation, he and his followers have employed the related concepts of neural physiology,—excitation, inhibition, irradiation,—to describe and explain animal behavior. These terms seem incommensurable with those used by many animal psychologists to interpret the selfsame behavior. Such anthropomorphic terms as 'problem,' 'lure,' 'punishment,' stress the purposive or adaptive aspect of activity and are for this reason avoided by the biologist who aims at the purely quantitative description achieved by the physicist.

The purpose of the present report is to show that ordinary animal learning as exemplified by the formation of conditioned reflexes can be conveniently and accurately analyzed in physiological, and hence predominantly quantitative, terms, but such an analysis is necessarily incomplete because it avoids the consideration of the biological utility of the reactions studied.

Three problems of learning will be discussed: First, the development of new conditioned reflexes in the sheep will be described in detail to show the gradual concentration of these reactions in space and time. Second, experiments concerning the negative adjustments involved in discrimination[1] and delay will be interpreted physiologically. Third, the limit of the animal's ability to achieve a balance between positive and negative conditioned reflexes will be discussed from the same point of view. Evidence[2] will be presented to show that as this limit is approached in the case of the sheep definite signs of hyperexcitability appear, often culminating in an abnormal state corresponding closely to the "experimental neurasthenia" of the dog so clearly described by Pavlov.

From such evidence it may be possible to express quantitatively an animal's capacity for making new adjustments to its environment, with the result that, as Pavlov suggests, a rational hygiene of the nervous system can be developed.

OTTO LIPMANN. *Arbeitspsychologische Ergebnisse der deutschen Wirtschaftsenquête.*

1. Methode des Arbeitsleistungsausschusses der deutschen Wirtschaftsenquête.

2. Uebersicht über die vom Arbeitsleistungsausschuss berührten arbeitspsychologischen Fragen.

3. Einige arbeitspsychologische Ergebnisse der Untersuchungen des Arbeitsleistungsausschusses: (a) die Wirkung des Leistungslohnes; (b) die Stellung des Arbeiters zum Sozialversicherung; (c) die Stellung des Arbeiters zum Naturallohn; (d) die psychische Einstellung des Arbeiters zur Mechanisierung; und (e) die Ursachen von Erkrankungen, Unfällen und Krankmeldungen.

4. Der allgemeine Zusammenhang zwischen Arbeitspsychologie und Arbeitswissenschaft.

OTTO LIPMANN. *Zur Einordnung psychologischer Eignungsfeststellungen in das Wirtschaftsleben.*

1. Eine psychologische Eignungsfeststellung kommt in Frage (a) bei der Neueinstellung von Arbeitern und Angestellten; (b)

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[1] Experiments of O. D. Anderson and W. T. James.

[2] Experiments of H. S. Liddell and O. D. Anderson.

bei Veränderungen der Stellenbesetzung innerhalb des Betriebes. Wenn z. B. in der Buchhaltung eine Stellung neu zu besetzen ist, so können hierfür auch solche Angestellten in Frage kommen, die bisher in der Korrespondenz beschäftigt waren, deren Eignung für Buchhalterei aber aus ihren bisherigen Leistungen in der Korrespondenz nicht ohne weiteres erkannt werden kann. Insofern es sich aber um die Frage des Aufrückens innerhalb *derselben* Abteilung oder darum handelt, der von den Arbeitern oder Angestellten einer Abteilung bei Betriebseinschränkungen behalten oder entlassen werden soll, ist die dem Abteilungsleiter bekannte *Leistung* von höherer Bedeutung als die durch psychologische Methoden evtl. feststellbare Leistungs*fähigkeit,* deren Mängel ja bis zu einem gewissen Grade durch erhöhten Leistungs*willen* ausgeglichen werden können.

2. Die Anwendung psychologischer Eignungsfeststellungen hat zur Voraussetzung die genaue Anpassung der Feststellungsmethoden an die Berufserfordernisse. Sofern diese Erfordernisse im Vorhandensein von Fähigkeiten bestehen (z. B. sicheres und rasches Rechnen), kommen für ihre Feststellung vorwiegend *Prüf*methoden in Frage; sofern der Beruf *Eigenschaften* erfordert (z. B. Ehrlichkeit), kommen auch sog. "tiefenpsychologische" (deutende) Methoden in Betracht, darunter z. B. auch die "Graphologie." Im Uebrigen aber interessieren bei der Eignungsfestellung solche Charaktereigenschaften natürlich nur insoweit, als sie eben für die Berufstätigkeit von Belang sind. Der Wert eines Eignungsgutachtens wird um so höher sein, je genauer es sich den Anforderungen einer oder mehrerer Berufstätigkeiten anpasst.

3. Wie weit eine Eignungsfeststellung die massgebenden Berufserfordernisse tatsächlich erfasst, ist letzten Endes nur daran zu erkennen, ob diejenigen, die bei der Eignungsfeststellung sich als besonders befähigt (unbefähigt) gezeigt haben, auch in derjenigen Berufstätigkeit, für welche die Eignung festgestellt wurde, besonders gute (schlechte) Leistungen aufweisen. Von einer Kritik der bereits verwendeten oder zur Verwendung vorgeschlagenen Methoden sehe ich hier ab, da letzten Endes eben nur

der *Erfolg* über die praktische Verwendbarkeit entscheidet. Für eine derartige *Eichung* einer Methode ist es erforderliche, eine Reihe von Vorversuchen anzustellen, deren Ergebnisse aber praktisch nicht verwendet werden, sondern nur zu Kontrollzwecken dienen dürfen.

Derartige Eichungsvorversuche können nach der Lage der Dinge nur innerhalb einzelner Betriebe unter Anpassung an die speziellen Berufserfordernisse veranstaltet werden. Betriebe und die Arbeiter und Angestelltenschaft solcher Betriebe, die sich zur Veranstaltung solcher Eignungsversuche bereit finden, machen sich um die Rationalisierung der Stellenbesetzungs-Praxis und um den Fortschritt der angewandten Wissenschaft verdient.

4. Die Methoden der Eignungsfeststellung sind grossenteils nicht objektiv fixierbar und daher an die Eignung des Gutachters gebunden; auch eine "geeichte" Feststellungsmethode wird in den Händen eines Gutachters, der die erforderlichen psychologischen Kenntnisse und Fähigkeiten nicht besitzt, zu falschen Gutachten führen.

5. Wesentlich ist ferner die *Neutralität* des Gutachters, d. h. nicht nur die Tatsache, dass er neutral, d. h. unabhängig vom Unternehmer und von der Angestelltenschaft *ist,* sondern auch, dass er von beiden als neutral *anerkannt* wird.

6. Die Anforderungen an den Gutachter werden am besten erfüllt, wenn die Gutachten von einer öffentlichen Stelle erstattet und auch aus öffentlichen Mitteln honoriert werden, d. h. wenn mit ihrer Erstattung z. B. Berufsämter oder im Auftrag von Berufsämtern-psychologische Hochschul-Institute u. dgl. betraut werden.

Die Schwierigkeiten der Durchführung dieser Forderung liegen, besonders soweit es sich nicht um Neueinstellungen, sondern um Veränderungen der Stellenbesetzung innerhalb des Betriebes handelt, darin, dass es gerade für die *Angestellten* einer Firma häufig Posten gibt, in denen ganz spezielle Anforderungen gestellt werden; die Kenntnis dieser berufskundlichen Eigenarten aber kann bei einer öffentlichen Stelle nicht vorausgesetzt werden, und es kann von ihr auch nicht verlangt werden,

dass sie ihre Feststellungsmethode der Eigenart dieser Anforderungen anpasst. Aus diesen und weiteren Gründen wird die Eignungsfeststellung häufig doch in den Betrieb selbst zu verlegen sein. Es wird sich dann empfehlen, um auch hier die Anerkennung der Neutralität des Gutachters möglichst zu wahren,— die oder deren Anerkennung dadurch gefährdet ist, dass er von der Firma besoldet wird,— dass der Angestelltenrat sowohl bei der Wahl der *Person* des Gutachters wie bei der Feststellung der Methodik mitwirkt.

7. Die individuellen Eignungsgutachten sind grundsätzlich durch den Gutachter vertraulich zu behandeln und nur im Einverständnis mit dem Begutachteten anderweitig zu verwenden.

8. Kein Arbeiter oder Angestellter kann gezwungen werden, sich einer Eignungsfeststellung zu unterwerfen, und seine Weigerung darf nicht den Grund einer Entlassung bilden, wenn bei der Einstellung des Arbeiters oder Angestellten von ihm anerkannte Arbeitsordnung nichts Gegenteiliges vorschreibt. Bei der Aufnahme einer solchen Bestimmung in die Arbeitsordnung sollen die vorher erwähnten Gesichtspunkte berücksichtigt werden.

OTTO LIPMANN. *Psychologie und Arbeitswissenschaft.*

W. LLOYD, see A. H. ARLITT.

H. H. LONG. *Intelligence Tests of Negro Children.*

We report 11,666 measures, drawn from more than 20,000 which have been made in grades 1–9 and years 6–12, inclusive, by means of the N.I.T., Dearborn, and Terman tests. Historically Washington negroes seem to be unselected. Children are required to attend school until 16 years old.

We have made comparisons by dividing the average mental ages by test norms based upon city white children in the North and West (these, of course, are higher than averages for white children in the United States). We have rather definite evidence that the lower ages, especially 6 and 7, are negatively selected.

It has been held that negroes are at most 75 per cent as efficient as whites.

It is suggested that scores on group tests are not directly comparable for different groups unless the 'testees' have had (a) from sufficiently early ages equal opportunity to become acquainted with concepts and materials, and adjusted to test situations; (b) equal or similar incentives to profit from opportunities; and (c) equal or similar incentives to achieve under test conditions. This last is conceived not as caprice of an 'act of will,' but as a function of ingrained experiences derived from (a) and (b).

These presuppositions would seem violated generally in negro-white comparisons. (a) The socio-economic isolation of the negro gives him small community experience even in large cities. (b) His religion in the home is usually sterile and discredits western culture. (c) His home and community life generally puts little emphasis upon the speed factor.

It is not likely that selection adequately accounts for the rise in test efficiency from year to year. The rise indicates that retarded culture in home and community depresses the scores whereas school experience increases them. It would follow that the 'nurture-nature' ratio is not constant. Our experiences emphasize the following: (1) We shall need to revise the estimates of negro-white differences in capacity. (2) Adequate test comparisons of racial or social groups with reference to capacity depend definitely from early age upon a common or saturating nurture.

HELGE LUNDHOLM. *The Evolution of the Concept of the Altrocentric and the Egocentric Tendencies.*

For the purpose of clinical application, it was found necessary to substitute for Jung's extrovert and introvert less collective concepts. As such the following were tried:

Altrocentric traits:	*Egocentric traits:*
Extrospective	Introspective
Extroactive	Seclusive
Sympathetic (altruistic)	Egotistic

The use of this scheme of personality traits allowed a more exact clinical description of personality types. Its application revealed, among other things, that, while traditionally the schizophrene is considered to display prepsychotically the introverted trait (in the sense of being seclusive and retiring), this is far from being always true. Schizophrenes are met with, not infrequently, who have been definitely extroactive previous to their psychosis. On the other hand, practically all of them show signs of egotism all through their lives.

As this egotism manifests itself very early in life, in fact as soon as conduct can be regarded as of social significance, we assumed it to be constitutionally pre-determined. This led to the establishment of the A- and E-tendencies, the former being defined as an innate disposition to develop altruistic sentiments, the latter as an innate disposition to develop egotism.

In our first discussion of these tendencies (1926) they were described as positive agents exerting a selective activity on the primitive motives, allowing only such as subserve altruistic and egotistic goals, respectively. Later consideration led to a modification of this view, in that the E-tendency came to be looked upon, not as a positive factor, but as a lack or defect, more especially as a constitutional absence, in the disposition of the individual, of the protective instinct and the submissive (disposition here taken in the sense Prof. McDougall gives this term in its narrower application). This modification of the concept resulted from an analysis of the motives which are involved in the ontogenetic evolution of social or altruistic character-integration. As such motives the protective instinct and the submissive appeared to us to be of supreme importance. Thus the egotistic type, who fails, from the beginning, to develop social character came to be regarded as constitutionally lacking these instincts, while the altruistic type, who grows into a social or altruistic being, came to be regarded as one who constitutionally possessed these instinctive tendencies in considerable strength.

A. R. Luria. *The New Method of Expressive Motor Reactions in Studying Affective Traces.*

1. The method of free association proposed by some psychologists for arousing and fixing affective traces is inadequate for

an objective study of this process. It deals only with the initial and final segments of the reaction and leaves us in ignorance of the neurodynamic structure of the process. We must connect this implicit associative process with an explicit objective system and observe the character of this objective process.

By changing the very structure of the implicit neurodynamic process, we may observe in this connected system the expression of the mental process and specific symptoms which differentiate the affective reactions from the difficulties in the intellectual sphere. A possibility of such a differentiation is important for the purpose of diagnosing affective traces (in the cases of crime-deception, hysteria and the like).

2. The method proposed is intended to be a study of the motor reactions which are connected with the associative processes. The subject is told to press with a finger on a pneumatic appliance while giving a verbal response. The disturbances of the motor curve express a corresponding affective change evoked by the verbal reactions.

3. Experiments with criminals and hysterics show that to every affective trace there corresponds a definite objective motor symptom. Such motor disturbances, correlated with 'crucial' stimuli, characterize the reactions of criminals. With this we find diffused motor disturbances, which usually characterize a general affective state of the subject and may occur irrelevantly in cases where the prisoner is wrongly accused. Subjects innocent of the crime and ignorant of its details did not yield such symptoms with crucial stimuli. Attempts to conceal the affective traces accentuate the objective records; confession of the crime (or the catharsis) brings about first the disappearance of the diffused disturbances and secondly the widening of the concentrated motor symptoms.

4. The typological analysis of the psychophysiology of the objective symptoms of affective reactions points towards the recognition of two fundamental types: (1) *reactive-labile,* the conflicts of which are exhibited very sharply and in which the symptoms of the motor disturbances assume a particularly pronounced form, and (2) the *reactive-stable* type, in which the

character of the conflict appears less sharp and is more readily isolated from the motor sphere. The affective traces of the latter manifest themselves as considerably weaker and show a more concentrated character.

5. This method suggests the possibility of recording the psychophysiological structure and typology of all the processes connected with the integration of human behavior and particularly with the revealing of affects and their traces.

FLORENCE MATEER. *Mild Hypothyroid Cases of Normal Intelligence Level.*

The more marked cases of hypothyroidism, including cretinism and myxoedema, rarely escape direct medical diagnosis, but there are many cases of the milder forms of thyroid deficiency in which the psychological findings may not only confirm the physical tendencies, but may antedate them or be far more obvious.

The basal metabolism rate is a generally accepted indication of the probable presence of glandular dysfunction, but its very accuracy in recording the general bodily activity may delay medical diagnosis unless findings from another field (the psychological, for instance) are available.

Uncomplicated hypothyroid cases form three clinical pictures when studied psychologically. Some show intellectual sluggishness, or a mental disability which is often rated as an actually lowered intelligence. Others show emotional disturbances, worrying chiefly about their introspectively recognized aboulia, and utter worthlessness. A third group is affected chiefly by the mental awareness of physically registered exhaustion.

An analysis of a group of 25 young adolescents showed that four reflected chiefly the emotional phase, four the exhaustion phase, and the rest showed direct disturbances of intellectual functioning.

The Kent-Rosanoff association test and tests of psychomotor control rate give results which tend to correlate with the basal metabolism indications, although it must be remembered that innumerable factors influence each test rating and so extremely high correlation would be improbable, and of little value if it prevailed.

Hypoparathyroidism plus hypothyroidism tends to produce a negative correlation between association test findings and the basal metabolism.

Changes in psychological findings are coincident with or antedate basal metabolism indications of improvement.

With medical treatment the psychologically obtained indications disappear, seemingly leaving the individual with a "changed personality."

The thyroid disturbances of a group of pregnant women yield similar indications.

FLORENCE MATEER. *Mental Tests and Clinical Psychology.*

An accepted essential will always be an abundance of worthwhile, statistically valid, thoroughly standardized mental tests. Mental tests are a necessary part of clinical psychology, but clinical psychology is not limited to the dogmatism of a few numerical evaluations of an individual or a group. There are other essentials which we are merely beginning to perceive, which we seldom appreciate, and the interference of which in statistics we greatly deplore.

Nineteen years ago the ease of applying a mental test series and obtaining a mental age, plus the apparent ease with which workers of little training could be taught to administer such measurements, gave the mental test phase of clinical psychology such an impetus to rapid growth that only now are the other phases of clinical work gaining a long-needed recognition.

The individual has been lost sight of in the mass of group measurements made upon his social group, and the number of ratings available concerning his prowess and disability, but he is still there, still an individual, as much a problem needing study, interpretation and solution as he was before tests were applied. The tests indicate some phases of his needs, but so far no guide to the interpretation of IQ's can replace the sympathetic, impersonal and skilled analysis of him from all possible angles.

To synthetize such analyses, when they have been made, requires thorough training, not only in the field of clinical psychology itself, but also into a breadth of perspective which enables the worker to see clearly the value of factors which can be modified or corrected by auxiliary avenues of human service. The worker also needs the background of a broad experience with the ordinary work-a-day world individual in order to keep his perspective. With such background and perspective qualitative analysis will become as automatic a part of his clinic procedure as the quantitative measurement.

And such qualitative analysis is imperative. The individual under consideration may always be the exception to all norms. Averages cannot determine a diagnosis, nor probable errors guide prognosis. For instance, an IQ of 90 may mean any one of the following conditions.

Low normality
Potential feeble-mindedness
Psychopathic personality
Psychosis
Beginning deterioration
Aphasia
Chronic fatigue
Hypoglandular conditions
Emotional inhibition
Inadequate handling.

Only qualitative analysis of one's findings can categorize the test ratings. Progress demands such procedures, if it is to be permanent. Let us have fewer new tests, less hurry, fewer figures, and more thinking.

F. N. Maxfield. *Subjective Judgment and Test Procedure.*

Mark A. May. *A Comprehensive Plan for Measuring Personality.*

Typical definitions of personality as given by psychologists are those of Watson and Allport. Watson says it is the " individual's total assets and liabilities on the reaction side." Allport says that "personality is the individual's characteristic reactions to social stimuli." These and other definitions place the emphasis on the side of social response. The notion seems to be that, if an individual were measured in a large number of variables on a series of scales yielding comparable scores, his personality would be his total score or his average score.

The concept of personality set forth here emphasizes the stimulus side of the question. It is that an individual's personality is not defined by the responses he makes to others, but rather by the responses others make to him as a stimulus. In brief, personality is an *individual's social stimulus value.* It is true that an individual's stimulus value is composed of an integrated series of variables including such things as physique, dress, manner, quality of voice, choice of language and habitual modes of response. To the sum, or average, or some combinations of these, others respond. But the individual's personality is not defined nor measured by this total score but rather by the way in which others respond to him.

From this point of view personalities may be arranged on a series of scales running from zero, or near zero, to some unknown amount depending on their respective stimulus values. That individual has zero personality who makes no impression on anyone. As a social stimulus he is 'zero.' From zero the scales may branch off in many directions depending on the types of responses others make to the subject. The measure of personality is found by counting or measuring the quality and intensity and direction of the responses evoked in others. It is recognized that the same individual will evoke different responses in different observers and will consequently have a somewhat different stimulus value for each person with whom he comes in contact. His personality score may very well be regarded, however, as some average or other function of these values. This scheme does not preclude the measurement of the individual by objective tests any more than the lifted weight experiment in psychophysics precludes the actual weighing of the blocks; but it does insist that a comprehensive plan for the measurement of personality must include the measurement of the responses made by others to the individual, as well as the responses that the individual makes to others and to objective test situations.

MARK A. MAY. *A Method for Correcting Coefficients of Correlation for Heterogeneity in the Data.*

Thousands of correlations have been computed between hundreds of variables in the field of social and mental measurements and yet not one coefficient has been definitely established even within the limits of four times its probable error. One reason for this is that the measurements are usually taken by different investigators and often with different instruments, under varying conditions, and on different populations. The resulting data contain two kinds of heterogeneity. The first kind is due to the imperfections of the instruments and the varying conditions under which the tests are given. This is commonly known as 'errors of measurement,' the influence of which on correlations is supposed to be eliminated by Spearman's formula for attenuation.

This paper is concerned with the second kind of heterogeneity which results from variations in population selections. Populations vary widely in respect to such heterogeneous factors as age, sex, race and social background, all of which influence many correlations. They will operate either to increase or decrease the correlation between two traits, depending on how they are correlated with each trait.

Two methods for removing their influence are in common use. The first requires that all correlations be computed on experimentally homogeneous data. The second is the partial correlation technique. A third method is proposed here that avoids the experimental waste and the arithmetical labor involved in the first, and the assumptions and other difficulties of the second. It is a simple formula for finding the correlation between two variables, when the deviations are taken from the means of the homogeneous sub-groups rather than from the mean of the entire measured population.

$$r_{\xi_1 \xi_2} = \frac{r_{12}\sigma_1\sigma_2 - r_{M_1M_2}\sigma_{m_1}\sigma_{m_2}}{\sqrt{\sigma_1^2 - \sigma_{m_1}^2}\sqrt{\sigma_2^2 - \sigma_{m_2}^2}}$$

The symbols σ_{M_1} and σ_{M_2} are the standard deviations of the means of the homogeneous sub-groups and $r_{M_1M_2}$ is the correlation between them. The labor required, in addition to computing the straight correlation in the usual way, is that of finding the means of the homogeneous sub-groups.

Some of the advantages of this method over the ordinary partial correlation method are: (1) It is more general than the Yule formula which may be derived from it. (2) It makes no assumptions concerning the linearity of the regressions of the two correlated traits on the heterogeneous factors. (3) It may be used even when the heterogeneous factors cannot be measured. (4) The heterogeneity may be eliminated to any desired degree all in one operation. (5) It shows clearly the relation between the correlation of the measures as deviates from the mean of the entire population and the correlation between the means of the sub-groups.

JOHN T. McCURDY. *The Biological Significance of Blushing and Shame.*

Blushing is a dilatation of minute vessels in skin where the tone of the vessels is already reduced (Lewis). Therefore it represents a preponderance of vagal over sympathetic stimulation. The physiological expressions of all emotions studied to date are sympathetic and have to do with activity, actual or prospective. Inhibition of the sympathetic system implies the opposite tendency, viz. inactivity. This means the immobility reaction, a method of anticipating danger by concealment.

Concealment is sought for practices during which primitive man is not in a position to defend himself quickly or is liable to attack. These are coitus, excretion, sleep and eating. Shame has developed chiefly in connection with sexual and excretory activities; traces of it appear with sleep and in table manners. During social evolution there has been an extension of shame to non-sexual situations, a development capable perhaps of explanation along psychoanalytic lines.

WILLIAM McDOUGALL. *Second Report on a Lamarckian Experiment.*

The Lamarckian experiment of which a first report has been published,[1] stating methods and results up to June, 1926, has been continued. One of the two procedures has been abandoned. The other (described as the tank procedure) has been applied to 23 generations of rats, and the animals of this stock have shown an increasing differentiation from the earlier generations and from control stock. There is now no question of the reality or objectivity of the difference between the trained stock and the control stock in respect of the greater facility shown by the former in solving the problem presented. Although the control stock shows a wide range of individual differences in this respect, all members of the trained stock of the later generations excel the control animals which exhibit the greatest facility. The facility with which any rat solves the problem may be best expressed in terms of the number of repetitions of the electric shock suffered before he learns to avoid it without error. The rats of the control stock manifest a facility ranging from 90 to 300 shocks, and an average facility of (roughly) 150 shocks. The rats of the later generations of trained stock range from 3 to 75 shocks, their average facility is (roughly) 40 shocks.

A very marked superiority in respect of facility in solving this particular problem exists, then, in the trained stock. It remains to determine: (1) What exactly is the nature of the difference (the superiority) established in the trained stock? (2) How has that difference been established?

In respect of (1), various possibilities suggest themselves, *e.g.*

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[1] *Brit. J. Psychol.*, 17, 1927, 267–304.

(a) superior general intelligence (Spearman's g factor); (b) a 'conditioned reflex' to the particular environmental stimuli (*e.g.,* an avoidance of the bright light); (c) an increased intensity or sensitivity of the fear-instinct in general, determined possibly by increased quantity of a specific fear-hormone. One fact bearing on the question is clear, namely, the rats of trained stock exhibit much greater *caution* in the experimental situation.

As regards the second problem, our main effort is to determine whether the difference (the superiority) of the trained stock can have been produced by some kind of selective process which may have operated in spite of our most careful efforts to exclude all such selection. Our efforts are now directed to answer these questions.

JOHN A. McGEOCH. *The Influence of Time-Interval and Retroaction upon Serial Position Values.*

The relative values of the different positions in serially learned lists of items are well known. The purpose of this paper is to report certain alterations of these values when retention, instead of learning, is studied and when retention has been influenced by retroactive inhibition. The data from four separate experiments on retroactive inhibition have been examined. In each experiment lists of nine nonsense syllables were learned by the anticipation method with a two-second exposure-time under the two customary conditions of rest and work. The interpolated learning under the work condition consisted of lists of nine syllables similarly learned. Varying degrees of learning of the original lists have been compared and both children and adults have been used as subjects. The serial position curves for learning have the typical form.

When relatively few repetitions are given in learning, primacy and finality are clearly superior at the first relearning presentation (recall). When, however, enough learning presentations are given to insure mastery, the serial positions at recall change their relative positions; the intermediate positions become more favored; and the first and last positions reverse their relative values.

Retroactive inhibition affects the serial positions differentially. The most striking instance of this statement is the fact that the smallest amounts of retroaction come toward the end of the list among the positions relatively less favored in learning, thus reversing the principle, which holds for total lists, that degree of retroaction varies inversely as the degree of learning.

When all correct anticipations at each position are considered, the resemblance between the curves for learning and relearning becomes less as degree of learning increases, until with as many as 26 learning repetitions the relationship is inverse. Here, also, the least retroaction occurs at the positions least favored in learning.

The finding that the serial positions relatively less favored at learning become relatively more favored at recall and relearning holds, however, for all degrees of learning and with both adults and children. These results have important theoretical implications.

JOHN M. MCGINNIS. *An Apparatus for Securing Moving-Picture Records of Eye-Movements in Young Infants.*

A small crib, supported only at the foot and containing an infant in the dorsal position, is inserted into a hollow cylinder (24 in. diam.), lying horizontally. The latter is supported at the head end by a bearing, and is rotated or oscillated about its axis at controlled speeds by mechanical means. Except for a slit extending around its middle, the cylinder has a white cardboard lining crossed by longitudinal black bars.

Light, from bulbs placed at the ends of the cylinder and screened from the direct view of the child, is filtered through transparent blue Cellophane and reflected on the child from the cylinder lining. This illumination is sufficiently strong for photography, and it elicits negative responses only from the most sensitive infants during the first week.

Eye-movements produced by the movements of the cylinder, are photographed by a Filmo camera, supported directly above the infant's face by a substantial frame, so that the slit in the cylinder lining comes between the eyes and the camera lens. The slit is covered with ordinary window-screen, which is coated on the inside with white paint so that the light reflected from this surface renders the camera practically invisible to the subject. This screen, which is black on the outside, permits successful photography.

Accurate records of the movements of the apparatus are secured on the moving-picture film by the following arrangement. A narrow, clear glass mirror is attached to the camera, in front of part of the lens, at such an angle that light from a small, bright source, located outside the cylinder at the focal distance from the lens, is reflected into the camera without interfering with the infant's response, or its registration. As the cylinder rotates, openings in a flange on its rim, corresponding to the position of each bar on the cylinder lining, permit the light to record a spot on the film, as each bar passes the camera.

When the cylinder is oscillated, the recording light is attached to the rim of the cylinder, near the flange, so that an uninterrupted spot of light moves from side to side in the picture, representing the oscillating cylinder.

NORMAN C. MEIER. *Aesthetic Intelligence: Its Nature and Emergence.*

Aesthetic intelligence (art judgment, aesthetic sensitivity) is the capacity to react with consistent accuracy to the quality-aspect of art, whether the response is to a painting, to architecture, to dress, or to interior design. Individuals vary greatly in the possession of it as measured by the Meier-Seashore art-judgment test. Even with the factors of age, scholastic level, general intelligence and social and economic status held approximately constant, great variations still appear. A child of twelve may make the same high score as an artist of forty, but probably owing to selection the artist and art-student class show scores almost entirely in the higher range. Aesthetic intelligence is manifested whenever the artist lays out a composition, selects details, or chooses to omit some item which would prove superfluous. In the layman it shows in the selection of details of dress, choice of design whether in a motor-car, a house or any other object or situation where an aesthetic judgment is made.

Recent investigation has indicated that aesthetic intelligence appears in the child at a very early age. A review is not attempted but two direct studies are cited. Cockrell (Merrill-Palmer) analyzed 1,550 paintings made by pre-school children during a nine-month period. These were all voluntary efforts, without instruction save manner of holding brush and wiping surplus paint off the brush; yet more than two-thirds showed recognizable design (presence of one or more principles of aesthetic arrangement or color harmony). Daniels (Iowa), using a new and trustworthy technique involving experiments with blocks in which both a naïve behavior response and a triple-check verbal response was secured, found unmistakable evidence that balance, symmetry, and stability are sensed by pre-school children with a surprising degree of accuracy. In these experiments the point is significant that the youngest child (of thirty subjects) constructed the most complicated set-up without error. The Iowa investigation constitutes a seven-year program, but results in the first year more than warrant the conviction that aesthetic intelligence emerges very early in life. However, facts are not at hand to explain how the perceptual-response possibilities in the child emerge and develop.

JOHN T. METCALF. *Empathy and the Actor's Emotion.*

Considerable attention has been given to the problem as to whether the actor experiences the emotion he portrays. The evidence has been gathered by psychologists and dramatic critics from prominent actors by the use of the questionnaire. The results have been inclusive. It seems to the writer that the question as stated envisages the problem in too simple terms. It may be answered affirmatively or negatively and either answer will be correct.

To the writer's mind the key to the true interpretation of the situation lies in the theory of empathy. The actor's work involves an imaginative identification of himself with something outside himself. The more fully he is capable of this, the more successful he will be in producing the visual and auditory stimuli which serve his audience as symbols of the meanings intended by the dramatist. Most of these meanings involve emotional attitudes. The actor's outward expression of these emotional attitudes will be most effective if he is able to make use of kinaesthetic and organic images. These images, however, must not become sensations, for in case they did the mental attitude would become one of real emotion instead of one of imaged emotion. If this occurred the actor would be behaving in a real and practical way, instead of using his art to represent an imagined situation in the realm of unreality. As for the affective accompaniment of the actor's emotion, it seems to be pleasant when the actor's work satisfies himself, unpleasant when he feels its shortcomings.

A. Michotte. *Quelques aspects de la psychologie de la perception négligés dans les recherches expérimentales.*

I. La plupart des recherches expérimentales en psychologie humaine semblent basées sur un postulat, d'après lequel la perception constituerait en quelque sorte le " terme," l'aboutissement des processus déclenchés par l'excitation. En réalité, loin d'être un " terme," la perception marque plutôt un début; elle amorce et conduit nos actions et peut être, à bon droit, considérée elle-même comme une simple " phase " du processus complet qu'est l'action. Phase de l'action, elle se développe sous la pression des tendances et des besoins qui dominent l'individu au moment de l'excitation extérieure et elle doit être fonction de ces facteurs.

Or, les tendances qui sont à l'oeuvre dans les expériences de laboratoire du type classique sont extrêmement peu variées et souvent bien faibles en comparaison de celles qui interviennent dans la vie courante. Aussi, les " perceptions de laboratoire " ne remplissent-elles en général que d'une façon rudimentaire le rôle fonctionnel de la perception dans la vie. Il semble dès lors nécessaire de développer les recherches dans ce sens; d'étudier la

perception humaine dans son cadre naturel (comme cela se fait, par la force même des choses, en psychologie animale) et d'établir systématiquement dans quelle mesure et suivant quels principes, les effets de l'excitation sensorielle sont déterminés par les besoins ou les tendances de l'individu.

II. Malgré le revirement qui s'est manifesté dans l'étude de la perception au cours des dernières années, l'influence du point de vue analytique en psychologie est telle que certaines catégories de phénomènes complexes n'ont guère été étudiées jusqu'à présent. Cette remarque vise spécialement la perception des actions physiques que les choses exercent les unes sur les autres et des transformations qui en résultent, telle p. ex. la perception du choc de deux corps et des effets mécaniques correspondants: bris, déformation, *etc.*

On peut se demander si la perception de ces "processus" se réduit en fin de compte, comme le veut l'hypothèse classique, à des perceptions élémentaires de mouvement et de changements qualitatifs ou quantitatifs, ou si, peut-être, ces perceptions ne sont pas des synthèses dynamiques d'un ordre supérieur, obéissant à des lois plus ou moins différentes de celles qui régissent les expériences plus simples. Ceci cadrerait davantage avec les données actuellement acquises de la psychologie de la perception. (Exposé de certains faits qui plaident en ce sens.) L'étude de ces "perceptions de processus" (auxquelles se rattache évidemment notre expérience du maniement des objets) est intéressante à divers points de vue. Ces perceptions paraissent jouer en effet un rôle essentiel dans la genèse de la "signification" des objets et même des mots, et, d'autre part, elles déterminent dans une large mesure notre comportement, puisqu'elles constituent la base de l'utilisation des objets qui nous entourent, comme outils, comme instruments de nos actions.

WALTER R. MILES. *Eye-Movements During Profound Sleepiness.*

Sleepiness normally concerns the eyes in very specific ways. They at times seem 'heavy' and it is difficult to keep them open. The visual field may appear dim and wavering. Since very little

sensory experience is associated directly with the eye-movements themselves, we have but slight basis for subjective reports on these movements. Photographic records show distinctive changes at the onset of sleep. Visual fixation at this time disappears and the eyes drift from one side to the other as if in visual pursuit of some slow moving object.

Just prior to the onset of sleep there are a number of indicators in the photographic records of eye-movements which appear to denote profound sleepiness. (1) The saccadic movements are slow. For the normal individual the average movement of 40° requires about 0.10 sec., but for the profoundly sleepy this same adjustment may require 0.16 to 0.25 sec. (2) The pauses for fixation are not steady. This wavering of the eye may be one or two degrees in amplitude, while the normal inaccuracy is probably one-tenth to one-fifth degree. (3) Corrective eye-movements are often of inappropriate size during profound sleepiness. Following a long saccadic movement toward a given fixation point an individual ordinarily has a small positive corrective movement. When very sleepy, he may fail to make these correctives or make correctives so large as to themselves need correction in the opposite direction. (4) Long saccadic movements are sometimes broken up into short movements by the sleepy. The pause of the eye between these short movements is apparently too short for adequate seeing to take place. These interruptions of the movement probably simplify the motor task. (5) As the sleep hunger becomes overpowering, the eye-movements are made slower, and are converted into a rolling pendular type of movement. When the movements are very slow the individual will not need to make corrective movements, for the eye arrives at its new point so slowly that it can correct its position while still in motion.

WALTER R. MILES. *Hyoscien* vs. *Alcohol: Effect on the Behavior of Rats on the Elevated Maze.*

The elevated maze provides opportunity for examining both the physiological and the psychological effects of drugs and other factors on the behavior of rats. The path is one inch wide and 30 inches above the floor; it involves right-angle turns and, as it is made up of interchangeable units, may be as complicated as desired. The equilibrium, posture, and locomotion of the animals are observed at the same time that one records the avoidance of *culs-de-sac* and the orientation in reference to the goal. The animals in this case were carried to the point of over-learning on a maze involving eight choices. The substances used were both given by intraperitoneal injection. The alcohol (one part per thousand of body weight) produced marked effects on equilibrium and locomotion, but no loss of orientation provided the animal did not fall from the path and have to be lifted up. On the contrary, hyoscien produced no apparent effects on the physiological side but caused the over-learned animal to explore the maze in a manner characteristic of the first trial. These animals retraced the path and frequently entered the blinds. They exhibited hesitation to eat (caution) on finally reaching the food. Both effects disappear rather promptly and leave no observable after-effects on the next day.

WALTER R. MILES. *The Effect of Environmental Temperature on the Patellar Reflex.*

These data were secured at the Carnegie Nutrition Laboratory in connection with an extended study on the influence of environmental temperature which F. G. Benedict has been pursuing. Most of the observations were taken by the writer on a single subject, an artist's (female) model, practiced in posing nude in fairly cold rooms. The subject sat reclining in a steamer chair and the reflex records were made in the intermissions between the periods when the trained nurse was carrying out sets of metabolism observations. The recording was from muscle thickening after the excellent graphic technique devised by Dodge. The intensity of blow on the tendon was accurately controlled. The reflex amplitude was the feature registered. Environmental temperatures varied from 30° to 15° C. Preliminary sets of reflexes were taken with the subject clothed and then every 20 or

30 minutes after the time of exposing the body to the room-temperature, which was held constant for the entire morning. Observations were continued for two to three hours.

The reflex is heightened at the time when rapid heat loss occurs due to the removal of clothing. Following this period the reflex is considerably less active, but with prolonged exposure to air that is below the physiological zero, the reflex becomes stronger and stronger. The base line defined by the tonus or tension position of the muscle in between reflex contractions also gives a very clear picture of the response of the skeletal muscles to the environmental temperature, in relation to the duration of exposure and to temperature levels. Sets of reflexes were taken with the muscles loaded with different weights and various attempts were made to secure a serviceable muscle tonus measure.. Shivering was found to be highly controllable by the subject and was not a disturbing factor in our measurements except after prolonged exposure to the lowest temperatures. The results give some basis for a statement of the influence of environmental temperatures on muscle tonus.

E. Miller. *Psychopathological Data for the Body-Mind Problem.*

The body-mind problem stands substantially where Descartes left it, mainly because his verbal brilliance crystallized the essential animistic bias in the very dichotomy. This communication does not make any claims to solve the problem, but it attempts to criticize existing views and to afford a restatement in the light of the neglected data of psychopathology. Of particular value are the phenomena that lie in the no-man's land between neurology and psychology that cry out for definition,—for example, the microptic appearances and the Lilliputian hallucination noted in temporo-sphenoidal disease. A step further and we have the same type of hallucinatory experience without demonstrable organic disease. The microptic phenomena may be regarded as purely cortical events, but neurology alone will not account for the breakdown of synthesis which produces the latter type of hallucination.

Although these 'events' are routed in the so-called mental and physical worlds at one and the same time, they cannot be regarded as belonging to a neutral stuff, for on introspection they prove to have been definitely determined by past experiencing.

The inadequacy of parallelism is clearly demonstrated in the phenomena of hysteria. One mental event may give rise to a large and complicated neuro-muscular or neuro-visceral disturbance; one-to-one correspondence does not exist. It is equally impossible to posit interactionism, as the logic of the situation will allow only for a relationship of succession and not of causality. When a certain situation leads to failure of the adequate biological response, the hysterical manifestations are not, as is often misleadingly stated, a physical expression of a mental conflict, but the substitution of inadequate visceral responses.

The hysterical oscillations between visceral and so-called mental moods is best explained not by a hypothetical psychophysical parallelism, but by an actual neurovisceral parallelism.

Mind at this point could be best regarded objectively in behavior as the total posture resulting from the 'neurovisceral posture' at any moment. Mind in the full sense is the historic posture of the organism.

The body-mind problem is not solved in any way by this attitude, but the facts bearing a 'mental mark' are thus made to fall into line with the so-called physical facts, although expressed in a different vocabulary.

The argument does not dispose of certain ultimate problems, such as the nature of awareness or of experiencing in general, but aims merely at stressing a biological approach in the light of certain bewildering psychopathological facts rather than theories.

EMILIO MIRA. *New Apparatus for Detecting the Accuracy of the Perception of Speed.*

The apparatus has been called the "perceptotaquimeter" by the author and it was devised in 1923 with the aim of testing the drivers of the Compania General de Autobuses of Barcelona. Some improvements have been made in it, not only by the author but by Mr. Lahy, who adopted the same device for selecting the drivers of busses in Paris. The present paper describes the demountable model which is actually used by the Psychotechnical Laboratory of Barcelona.

On a table, fifteen feet long, three small rods are deployed in the same or in opposite directions at the will of the tester, with different speeds which are regulated by means of a rheostat which allows changes in 'absolute' speed and several pulleys which allow the changes in 'relative' speed between the three rods. The subject sits fifteen feet in front of the apparatus and is requested to indicate the point of meeting of the rods as early as possible from the moment in which they begin to move. Four different sets of experiments can be conducted in this way, according to the number of rods in movement and their directions. The subject is classified according to the rapidity and the accuracy of his responses. In order to control the amount of his error there is one scale placed below the rods along the table. The subject tells the number of the scale in front of which he expects the crossing of the rods. The accuracy of his perception of speed is given by the value of the distance lying between this number and the number in which the rods 'really' meet.

EMILIO MIRA. *New Directions in Testing Affectivity.*

All psychologists will agree that, in spite of being the most 'vivid' experience of our self, the feelings are the most difficult to test by objective means. Nearly all the methods and techniques that have been proposed for the experimental testing of affectivity are deficient because they are not capable of arousing in the subject an adequate response, or, if so, they are not able to register it in a correct way. The principal obstacle is constituted by the moral censorship of the tester that prevents the setting of experimental situations sufficiently realistic to determine the arousal of affective reactions on the subject.

The author believes that this obstacle will be overcome, and that the psychologist has the same right as the physician to arouse some unrest in the subject for the purposes of investigation, provided that in this way some benefit for the individual can be obtained. Thus he has created different tests by means of which the subject is plunged into an emotional situation in order to detect his feelings of unselfishness (which are, of course, the most important feelings to be tested).

Here follow the general directions of one of these tests. It is of collective character and for students:

"During the class the tester appears suddenly, speaks some words with the teacher and announces that a boy (or a child) has been brought to the hospital very severely injured by a car. He has lost a great deal of blood and will die if a blood-transfusion is not made to him at once. The speaker says he is an assistant physician that has come with two assistants for obtaining blood of those who are willing to offer it. In order to calculate the quantity of blood that shall be removed from every 'giver' he begs every pupil to write at once on a bit of paper, 'yes' or 'no,' and in the first case how many ounces of blood he is disposed to offer. He is told that the maximum that can be obtained without a great danger is 16 ounces."

When the answers have been obtained one new message reports that the boy has died.

The details of technique and the results obtained are to be explained in the original paper. The author concludes that they are sufficiently interesting to follow the investigation in this new way.

THOMAS VERNER MOORE. *Insanity and* g.

Tetrad differences for correlations of tests of reasoning, perception, span of memory, rate of forgetting, and poverty of emotional expression, given to 213 insane patients, were found to approach zero within the limits of sampling. This enables us to conclude that there is a *g*-factor in cognitive defect. It is suggested that this *g*-factor, found to be defective in certain psychotic conditions, is the same *g*-factor that has been discovered in various measurements of normal individuals.

The mathematical proof of the tetrad equation excludes the possibility that the *g*-factor can be any one of the specific factors that enter into its determination. It also rules out the hypothesis that the *g*-factor is the sum total of the specifics. At the present time it is idle to speculate as to the nature of the *g*-factor. Attention is called to certain conditions which must be fulfilled by any measure which purports to be a direct determination of the *g*-factor:

1. It must correlate with the individual specific factors to the degree found in our tests (or *mutatis mutandis* to the degree found in any similar battery) within the limits of sampling.
2. It must correlate with our group of tests, weighted and used as a battery, 0.914 ± p.e.
3. Should one attempt to use the measure of the *g*-factor as a specific variable and calculate the resulting tetrads, the tetrad equation would no longer hold and the correlations of the variables with their supposed *g*-factor partialed out would no longer approach zero.

Considering the number of mental abilities that have been found to contain the cognitive *g*-factor, and the fact above pointed out that none of the specifics nor their sum can be the *g*-factor, it is unlikely that the *g*-factor will ever be identified with any specific mental ability. It is, therefore, in all probability, a neurological factor related to psychological performances in some such way as the inorganic rainfall to the organic crops.

Five other *g*-factors are pointed out as underlying various psychotic conditions, and it is suggested that they, too, are of a neurological nature. The cognitive *g*-factor has a negative correlation with the *g*-factor in 'constitutional hereditary depression.' Cognitive defect is, therefore, a symptom of *precox,* rather than manic-depressive conditions.

THOMAS VERNER MOORE. *The Empirical Determination of the Syndromes of Psychiatry.*

A clear empirical definition of the syndromes of psychiatry is lacking at the present time, and this deficit is largely responsible for the difficulty now experienced in associating biochemical reactions with the various mental conditions. The present study is an attempt to apply modern statistical methods to the definition of psychotic disorders. The first step consisted in a formulation of descriptive estimates of a number of apparently unit symptoms; the second, in the development of a quantitative technique for measuring the degree in which these symptoms are manifested in psychotic patients; the third, in the intercorrelation of the measurements thus obtained and the determination of the groups of symptoms that are causally linked together; the fourth, in the preparation of a diagnostic chart that will show at a glance the distribution of symptoms in any individual patient. An attempt is also made to link the empirically determined syndromes of psychiatry with the present more or less commonly accepted diagnostic entities. This study is based on an analysis of over 350 cases.

John J. B. Morgan. *Clinical Studies of Motivation.*

Clinical studies of human conduct have demonstrated the following principles: (1) Each act is determined by many causes so that it is futile to search for a single cause. (2) A subject can rarely give an adequate explanation of his own conduct. (3) Different observers are likely to differ in their explanations of the conduct of the same person. (4) Even effective reëducation cannot demonstrate the relative importance of motives.

These principles may be illustrated by experiments in post-hypnotic suggestion. (1) One subject did as he was told but gave a rationalized explanation of his motive. (2) One subject failed to do as he was told because of social inhibitions, making barely perceptible incipient movements of which he was not aware. (3) A third subject, having been given the suggestion to swear, failed to do so but stammered instead.

These experiments, as well as clinical experiments in reëducation, demonstrate the interplay of different motives. An adequate description cannot end with the reduction of these to such vague concepts as libido, urge toward superiority, instincts and complexes, but must involve specific studies of the life experience of the patient.

With such a history various attempts may be made to reëducate the subject. The resultant relative success or failure of this education will throw some light on the relative importance of the different motives behind the conduct in question, but even such a demonstration of the presence of one motive does not preclude the possibility of other equally potent motives.

John J. B. Morgan. *Effect of Noises upon the Human Organism.*

The reactions of human infants to pure tones have been studied. It was found that tones of 64 to 128 vibrations were soothing, while those of 2,048 and 4,096 were irritating. The high tones were more irritating with an increase in intensity, but intensity was not so effective with the lower pitches. Pitches of 512 and 1,024 were neither consistently soothing nor irritating.

Using the galvanometer for records, reactions of adults to pure tones and to noises of various sorts are being studied. Some of the tentative conclusions are as follows:

1. A stimulus to which the subject makes no marked response when he is awake, either by means of a statement of dislike or as indicated by the galvanometric record, may elicit a marked reaction when the subject is under hypnosis. This difference cannot be due to suggestion, for no statement of any sort was made about the nature of the stimulating sounds.

2. Pure tones or a warble note, consisting of a rapid alternation of two pure tones, do not affect our subjects nearly as intensely as a mixture of heterogeneous sounds. The types of noises which produced the greatest effects were the records of a number of people talking at the same time and the sounds from a transcribing room in a business establishment, both greatly amplified.

3. These studies seem to indicate that the reactions of the human organism to noises are emotional responses. When awake these emotional reactions can be fairly successfully inhibited, but under hypnosis they manifest themselves very clearly. In addition to the galvanometric records the subjects showed marked

visceral disturbances, nausea, writhing, weeping, and made active requests that the noises be stopped.

John J. B. Morgan. *Mental Hygiene in Schools.*

Four years' work on a program of mental hygiene in connection with the public schools of Evanston, Illinois, as well as with the students of Northwestern University, have led to a formulation of the following statements.

1. The earlier in the life of an individual any maladjustment is discovered and treated, the greater the chances of success.

2. The methods of handling a maladjustment vary with the age of the individual. Whereas, with an adult, readjustment is done directly with the individual with some success, with children the most effective methods are indirect ones. Little is gained by talking about the difficulties as the psychoanalysts do. The best technique is to discover the nature of the child's difficulty and then to modify his treatment in the home, school, or playground so that a different adjustment is effected.

3. It follows that the best results in mental hygiene in the grade schools would not be brought about by multiplying clinics to which maladjusted children are brought. The fewer the clinics, the better.

4. The important problems are not medical ones; hence the persons in charge of this work should be educators and psychologists and not physicians.

5. The ideal procedure would seem to be to have in each school one or more counselors who study the maladjusted children and who have enough authority to effect the desired changes in their treatment. In this way the child does not come to a clear-cut recognition that any one thought him very peculiar, the treatment he receives is not recognized as treatment, and he can be adjusted without ever being brought to a keen realization that he was badly maladjusted.

6. The readjustment that is effected should be as straightforward as any branch of education. The counselor is a form of special education instructor. He teaches, not so much verbally,

as by creating situations which call forth the desired reactions from his pupils.

F. A. Moss. *Relation of Mental Disorders to Crime.*

No one is a 'born criminal,' but many are born with tendencies which predispose to a criminal career. Of the predisposing causes to crime, mental disorders constitute an important group. The most important types of mental disorders which predispose to crime are epilepsy, paranoia, paresis, dementia praecox, and senile dementia.

1. *Epilepsy.* Preceding or immediately following an attack of epilepsy the person may be considerably excited, showing undue irritability, and sometimes a condition known as epileptic furor. In this condition he is totally unaware of his acts, and, due to his excitement, is liable to kill anyone with whom he comes in contact. A short time ago the writer examined a young man who, when in a state of epileptic furor, had killed his mother. He was practically normal except at about the time of an attack.

2. *Paranoia.* Paranoia in its course of development usually leads to a stage in which the individual is very likely to commit crime. The delusions of persecution characteristic of this disease are at first rather generalized, and the person attempts to run away from his persecutors. Later the victim of the condition picks out some particular individual or individuals as his persecutors, and very frequently turns and attacks these supposed enemies. It often happens that the unfortunate victim of this attack was totally unacquainted with the paranoiac, and had never harmed him in the least.

3. *Paresis.* The person suffering from paresis very frequently reaches a stage in which his marked lack of judgment, dissolute living, and grandiose ideas couple together to produce criminal behavior. A previously respected citizen suddenly begins to associate with dissolute characters and to sink into drunkenness and debauchery. At such times he may commit various types of crimes, especially those of a sexual nature, or, due to his grandiose delusions, he may imagine himself immensely wealthy and try to pass bad checks.

4. *Dementia praecox.* Dementia praecox is accompanied by such marked mental deterioration that the judgment is seriously impaired, and all sorts of anti-social conduct may be manifested. Like paranoia, it is frequently accompanied by delusions of persecution, which make the individual suffering from the disease commit crimes against his persecutors. He hears imaginary voices speaking to him, and these voices often incite him to acts of violence.

5. *Senile dementia.* In senile dementia the normal inhibitions become greatly weakened, resulting in the manifestation of anti-social conduct, particularly vagrancy and sexual crimes. Paranoid delusions are often developed and occasionally lead to such serious crimes as murder or arson.

ENRIQUE MOUCHET. *La perceptibilité tactile de l'aveugle.*

[Par le procédé des différences minimes perceptibles, en employant le compas de Mercante, ex-professeur à l'Université de La Plata, l'auteur à examiné très exactement la finesse tactile de la pulpe des doigts.]

Je suis arrivé à la conclusion que la distribution de la finesse tactile de la pulpe des doigts—veritable œil tactile—est très semblable à celle de la rétine. Le maximum de la finesse correspond à l'un de quatre points vers le bout du doigt et situés dans une ligne qui traverse le milieu de la pulpe en sens longitudinale. En nous éloignant dans une direction quelconque de ce point, que j'appelle par ressemblance la *tache jaune* tactile, la finesse diminue comme diminue la perceptibilité rétinenne en nous éloignant dans une direction quelconque de la tache jaune. Cette diminution de finesse est beaucoup plus prononcée en sens transversal qu'en sens longitudinale.

De la comparaison de la finesse tactile à la pulpe de l'index droit de douze voyants et de l'index " lecteur " de douze aveugles, je suis arrivé à ces conclusions: (1) La finesse tactile chez l'aveugle, en règle générale, n'est supérieur à celle du voyant en aucun point de la surface cutanée de la pulpe des doigts. (2) Tandis que pour le voyant, en règle générale, chaque point a une

finesse différente et le maximum de sensibilité, en conséquence, reste localisé à un seul point, chez l'aveugle nous trouvons fréquemment qu'une même finesse tactile s'étend à plusieurs des quatre points, parfois à tous. En ce cas, souvent cette finesse correspond à celle de la sensibilité maxima. (3) Parfois nous ne trouvons aucune différence entre la finesse tactile de l'aveugle et celle du voyant. (4) Il n'y a aucune différence entre la finesse tactile des doigts " non lecteurs " de l'aveugle et celle des voyants.

ENRIQUE MOUCHET. *L'image verbo-visuelle dans le mécanisme de l'intelligence.*

Dans l'intelligence intuitive de l'homme prédomine l'image visuelle. L'œil est le grand sens de l'intelligence intuitive, tandis que l'ouïe, véhicule naturel de la parole, l'est de l'intelligence conceptuelle.

Ces prémisses emmenèrent les psychologues qui ont étudié spécialement le mécanisme du langage intérieur (Charcot, G. Ballet, D. Bernard, Déjérine, Egger, Stricker, Paulhan, Lemaître, Kussmaul, Saint Paul, Grasset, *etc.*, et, en Argentine, J. Ingenieros, H. G. Piñero et R. Senet) à donner grande importance à l'image verbo-visuelle, à tel point que le " type verbo-visuel," arrivait, dans leurs statistiques, au 40% pour Lemaître et Senet, au 27.5% pour Saint Paul (compris le type verbo-visuel et les types composés: auditivo-visuel, visuello-moteur).

Mais cela est la conséquence d'une fausse généralisation et d'une erreur de méthode. Avec leurs intérrogatoires ou par leurs enquêtes ils constataient facilement, à cause justement du grand pouvoir de visualisation que nous possédons, que beaucoup d'individus voient mentalement un mot ou une phrase, avec leur propre écriture, comme imprimé, ou avec une écriture quelconque. Ils déduisaient de cela qu'ils appartenaient au type verbo-visuel.

Cette conclusion est pourtant erronée. Il y eût une erreur de méthode. Les psychologues ont etudié l'imagination visuelle et non le type endophasique. Nous visualisons facilement un ou plusieurs mots; mais nous le faisons comme nous pourrions visualiser un objet. Beaucoup d'enfants des écoles, qui ont une bonne mémoire visuelle, quand ils récitent leur leçon par cœur ont une image fidèle de la page du livre; ils lisent dans un livre imaginaire, qui reproduit avec fidélité la page du livre réel. Quelque chose de pareil se produit chez quelques acteurs, lesquels lisent dans une page imaginaire, qui reproduit avec fidélité la page réelle.

Ces sujets, qui selon les statistiques psychologiques sont verbo-visuels, quand ils pensent verbalement (endophasiquement) leur propre pensée, *ne visualisent point leur langage intérieur: ils ne sont plus verbo-visuels.*

Une longue expérience sur le thème, continué après la publication de mon livre, *El lenguaje interior y los trastornos de la palabra*[1] me permet de soutenir que le *type verbo-visuel n'existe pas:* c'est un fruit artificiel de la laboratoire.

Outre, la lecture, comme fonction socialisée, n'est suffisamment consolidée—et encore aujourd'hui une partie considérable de l'humanité est illettrée—pour que le type verbo-visuel n'ait pu se constituer.

Les vérités psychologiques peuvent et doivent être soumises au contrôle de l'expérience immédiate; c'est un avantage qui compense les difficultés des méthodes de la psychologie. Ma thèse, par son caractère général, peut être soumise par tous, psychologues ou profanes, à la preuve de l'expérience immédiate. Cette preuve donnera à chacun la conviction de la vérité de ma thèse: *généralement, nous sommes visuels, mais non verbo-visuels: le type endophasique verbo-visuel n'existe point.*

Les uniques images importantes dans le mécanisme du langage intérieur sont l'image auditive et l'image motrice. Généralement, apparaît une d'elles dans la conscience, et l'autre s'éclipse dans la subconscience avec le complexe des éléments intellectuels, affectifs et dynamiques qui constituent la parole intérieure. L'image sensorielle consciente, auditive ou motrice, n'est autre chose que la façade visible à l'esprit d'un grand édifice mental souterrain: la parole intérieure.

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[1] Vol. I. de la *Biblioteca Humanidades,* éditée par la *Facultad de Humanidades* de l'Université de la Plata, 1923.

K. C. Mukherji. *Is Gregariousness an Instinct?*

The paper presents a critique of gregariousness conceived as an instinct. It surveys a number of instances of behavior, human and animal, particularly of the Damara calf, in the herd and in isolation. The analysis shows that there is little basis for supposing that gregariousness is '*innate*.' On the other hand, the facts tend to show that the gregarious habit arises through the operation of a number of psychophysical factors such as sympathetic induction, imitation, and suggestibility. The natural conclusion is that if any process is to be regarded as innate, it is these latter ones and not gregariousness.

Elsie Murray. *The Biopsychic Genesis of Esthetic Values.*

The progress of esthetics as experimental science is blocked by three outworn conventions. The *first* maintains that affective values are epitomized by pleasantness-unpleasantness; the *second,* that the esthetic elements are identical with the artifacts of physiological psychology; the *third,* that esthetic values are mediated by 'associations.' These three postulates have given rise to numerous and disheartening studies of the agreeable-disagreeableness of hues, brightnesses, consonances, and dissonances, curved lines and straight, *etc.,* all of which are grounded inevitably on the paradox of individual differences and the relatively universal appeal of art.

On the basis of laboratory researches otherwise conducted, we propose to replace these older, cruder notions with the following assumptions. *First,* the primary problem of esthetics is the *expressiveness* of the esthetic factors—their immediate excitingness and soothingness, *etc.,* rather than their pleasant or unpleasant toning. *Second,* the simpler forms, rhythms, color combinations, melodic phrases, *etc.,* as these occur in everyday experience, rather than the abstracted 'elementary mental processes' like tones or colors, constitute the true esthetic elements. *Third,* the expressive value of the latter rises directly out of the biopsychic life of the individual, not by way of 'associations', but through an immediate merging of proprioceptive and exteroceptive experience. In music, *e.g.,* the esthetic value of the various instrumental timbres (of violin, trumpet, or oboe) are derived largely from early vocal or speech experiences. The timbres characterizing the human voice under the stress of passion, rage, mockery, absorb, as it were, the corresponding feeling tones. Later, the affective values thus originating blend directly with the sensory texture of similar auditory complexes, without the need of interposed ' associations ' or the recall of the original setting. Thus arises, in large measure, the mysterious expressiveness of music, as hinted by Vernon Leesin in her doctrine of empathy or *Einfühlung.*

The view here sponsored takes issue with the dogmas both of *Gestalt* and of behaviorism—with Köhler's spontaneous ' sensory organizations,' and with the ' conditioned reflex ' and the ' adaptive reaction.' The esthetic rudiments are organized partly under the pressure of tuition, largely through free experience of an exploratory nature. Swayed in large measure by the general set of the moment, as determined by mood, expectation, or the dominant element in situation or object, they and their values are more pliable and fluent than either of the schools above mentioned would readily admit. The same tonal complex or color combination, *e.g.,* may express now gaiety, now clash and tension.

J. P. NAFE. *Critique of the Concept of Quality in Felt Experience.*

Felt experience may be accounted for in terms of four independent variables—intensity, duration, extensity, and density—correlated with series of impulses varying only in their temporal and spatial relations as follows: (a) in frequency of impulses, (b) in duration of discharge, (c) in extent over which the impulses arise, and (d) in the relative number of fibers activated within such an area. The concept of ' quality ' is inadequate to the facts.

Similar stimulus objects will, from time to time, set up similar conditions within the tissues and these conditions will be accompanied by similar psychological experiences. The ability or inability of an observer to analyze such an experience constitutes no real proof as to the nature of its correlated neurological mechanism.

Further complications of experience are occasioned by the reflex activities set up, either from felt experiences or from experiences aroused in other sense departments. Such activities are of two very different sorts.

1. Activity of muscular and glandular systems results in activity of afferent fibers and is accompanied by felt experiences. Even slight contacts are accompanied by such reactions and with increase in frequency and duration of impulses such reflexes increase in number and vigor. They may consist of vaso- and pilo-motor activity, *etc.,* chills, shudders, quivers, goose flesh, laughing, weeping, *etc.,* and coördinated or uncoördinated activity of skeletal muscles. Pain, affective experience, and the emotions have their bases in such reflexes.

2. Consciousness itself is reflexly aroused. The more intensive a series of impulses the more likely is it to be accompanied by a conscious experience. Series of impulses of low frequency and duration are not likely to be accompanied by consciousness at all. This depends upon the general conditions governing consciousness which, as far as they are known, are expressed in the laws of attention.

The criterion for localization is the cortical locus of the central connection of the particular fibers involved and localization must be learned.

The writer offers psychological and neurological proof of the following points: (a) that a record of the afferent impulses from a painful stimulation shows the frequency and duration of the impulses but does not contain a record of the 'painfulness'; (b) that experiences of warm and cold are aroused in the same general manner as thermally indifferent experiences but include characteristic increments by which they are identified; and (c) that localization is learned and that hence the theory of 'local sign' is inadequate and a theory of cortical locus fulfills the necessary conditions.

S. M. Newhall. *A Quiet Electrical Key.*

This key is intended to meet the occasional need of closing or opening a circuit when near a subject without his knowledge. It is adapted to laboratory circuits of small inductance and current, such as are commonly used to operate a relay, electromagnetic signal, or recorder. In such a circuit, and when operated without special care, the key is inaudible at about 50 cm., but when manipulated rather slowly it cannot be heard at 10 cm. or less. The key as constructed is convenient for holding in the hand, though within wide limits size and shape are matters of comparative indifference. It is the construction of the parts making contact that determines the quietness of operation, and these parts are designed to minimize the chief cause of noise, namely the jar of impact. The contacts are of platinum mounted on 33-guage spring-brass strips, which are backed with relatively thick rubber cushions.

The quiet contact is adapted for application to an ordinary laboratory key by a compact unit construction including a small bolt and nut. If the regular lower contact of the key is removed this quiet unit may be bolted in the old hole; replacement of the upper contact is not necessary. Keys of the unpivoted spring-lever type, not requiring a stop to limit the movement of the lever when released, are most suitable because they necessitate no other change except readjustment of the separation of the contacts by the mere turning of the adjustment screw carrying the upper contact. Keys of the pivoted lever type require a further change to silence the impact at the top when the key is released. A thin rubber cushion, such as a rubber band, is effective, and it may be placed either on the stop itself or on the lever.

R. M. Ogden. *Meaning and Symbolism.*

In an effort to escape anthropomorphism modern science has tried to conceive its subject-matter stripped of all meaning. The existentiality of anything—what it is in its own right—can then have external but no internal connections with anything else. Such a conception has the advantage of a sharply critical attitude with respect to the essential nature of things, but it has the serious disadvantage of describing things only in terms of abstract predetermined categories. These categories must themselves have been derived from direct experience where things occur in a context to which they belong. In stripping off this context, the investigator renders his subject-matter unreal by describing it in terms which are necessarily abstract. The symbolism of a mathematical or logical formulation of some actual event, however *true* it may be, will account only for certain aspects of the event in question. The very effort to avoid entangling alliances by so unduly restrictive a treatment defeats its own end, because the actuality from which every investigation takes its departure is a concrete perceptual event, the meaning of which is implicit in its very existence. Instead of stripping off all meaning in order to get at the nature of the event itself, the problem of scientific investigation is one of differentiating the meanings of the physical and experiential aspects of the event. This differentiation is made with the aid of symbols—abstract counters or tools—which have been derived from concrete perception by a scaling of the gradients of events with respect to their natural limits. Thus symbols, like the pigments of a painter's palette, are means of recording and expressing something, the concrete reality of which can never be completely translated in such terms. In order to avoid 'meaning' one must also neglect function, thus reducing the event under investigation to a bare skeleton devoid of life. A catalogue of parts has no significance unless the parts work together, and their functional togetherness, or meaning, is just as primary a datum of their existence as the bare bones of their parts. The meaning of a dynamic structure is the togetherness of its parts; indeed, its parts are determined by its meaning and not its meaning by its parts.

WILLARD C. OLSON. *The Quantification of Direct Observation.*

It has become trite to say that all science consists in observation and that progress in science is conditioned by the development of methods for making more accurate observations. In general, the tendency in psychology has been toward the development of methods of accurate observation through careful control of conditions and mechanical records of responses to defined stimuli. In certain fields of investigation our knowledge of effective stimuli for given responses is so limited that we cannot immediately arrange laboratory conditions for the measurement of the complex behavior in which we are interested. In order to describe and analyze the concomitants of the behavior it becomes necessary, therefore, to use some method for recording direct observations of the behavior in its natural setting. The extent of use and the importance of direct observation in the study of animals and children justify an attempt to formulate certain methods and principles by which valid and reliable quantitative records may be obtained.

The present paper is concerned with (1) the development of a method for observational measurement, (2) the principles underlying measurement by direct observation, and (3) illustrations and applications of the method to certain fields of human behavior. The essential steps in the method consist in (1) the selection and description of the behavior to be observed, (2) the definition of the unit of measurement, (3) the description of the conditions of observation, and (4) the description of the method of making the record. The unit of measurement may be defined, in general, as one manifestation of the designated behavior in a stated period of time. Differentiation is produced by taking successive samples. The method is illustrated in application to nervous habits and conduct disorders in children. A survey of the clinical literature yielded an inventory of nervous habits in the category of tics. These were grouped into oral, nasal, hirsutal, ocular, and aural categories for purposes of observation.

A series of charts based on the same population illustrates how the method increases the differential value of the observations from dichotomy (the usual presence-or-absence type of description) to a continuous distribution which yields a statement of amount for each individual. The dependency of differentiation, reliability, and validity upon the total time of observation and the frequency of occurrence of the observed phenomena is demonstrated. In general, better differentiation and greater reliability is secured for a given total time of observation for frequently occurring behavior.

L. J. O'Rourke. *A New Emphasis in Federal Personnel Research.*

The paper deals with the extension of the activities of the United States Civil Service Commission to include a placement program of national significance—a project which augments to a considerable degree the Commission's opportunities for effecting improvement in personnel technique.

The project involves each of the following activities:

(a) A more thorough study of positions in the Government service, from the point of view of duties performed, qualifications required, problems of fatigue and energy expended, present and needed training courses, and present and possible lines of promotion.

(b) The development of improved personnel technique and the refinement of means (objective and subjective) of measuring qualifications.

(c) The establishment of principles, and the setting of standards.

(d) The determining of general employment standards in industry, by a committee headed by Mr. Henry S. Dennison, president of the Dennison Manufacturing Company. (This committee's findings not only are of value to employers, but also serve as aids to vocational guidance in schools and colleges. The activities of the committee are coördinated with those of the Taylor Society, the Personnel Research Federation, and the Society for the Promotion of Engineering Education.)

(e) A study of attitudes in so far as they condition the workers' success or failure. (The advisory committee is composed of Dennison, Mayo, and Thurstone.)

(f) The releasing of Civil Service tests, with Federal and industrial standards, to schools for purposes of guidance.

(g) The development of information charts which acquaint the student or the applicant with job requirements, duties, salary range, and opportunities for training and advancement, and which interpret his test score in terms of the fixed requirements for various positions, thus directing him to positions for which he can qualify.

(h) The facilitation of placement of college students, by means of a study of the opportunities which the Federal service offers to students who are pursuing their university work and to students who have completed their scholastic training. (A college placement committee representing leading universities is assisting in this study.)

(i) The adjustment of commercial curricula to meet some of the practical needs of industry, as indicated by the study of causes of success and failure.

(j) The development of the prestige of the Federal service, by improving morale and offering inducements to superior personnel.

S. J. ORTON. *Organic Backgrounds in Maladjustments.*

GOPESWAR PAL. *The Difference Limen in the Perception of a Continuously Increasing Weight.*

A lengthy investigation extending over a period of two years has been carried out in the Calcutta Psychological Laboratory to determine the upper difference limen in the perception of a weight continuously increasing. An attempt has also been made to find out how far the difference limen changes with different rates of increment and with different initial weights.

Three sets of experiments have been performed under three different attitudes, viz., stimulus attitude, pressure attitude, and kinaesthesis attitude. Full introspective reports have been taken with regard to the contents of consciousness during the period of preparation as well as during that of observation. Least noticeable rates of change with reference to different 'standard' weights have been determined. The least time for noting the first change has been determined and its relation with initial weight and with different rates of increment have been studied.

The following conclusions are drawn.

1. The complex nature of weight-consciousness is clearly manifest. The complexity is enhanced by the phenomenon of adaptation and shift of the initial muscular adjustments. The experience of weight as such under the stimulus attitude is as much a mental process as the experience of pressure or kinaesthesis; likewise the experience of the latter, as well as that of the former, may be regarded as an object.

2. Weber's law is satisfied under each attitude in relation to the least noticeable rates of change; but it is not satisfied in relation to the least time. The cases, however, where the rates of increase are neither too fast nor too slow, indicate partial conformity to Weber's law.

I. P. Pavlov. *A Brief Sketch of the Highest Nervous Activity.*

At present the physiologist has a sound basis on which he may recognize the difference between the unconditioned and the conditioned reflexes in the activity of the nervous system. The unconditioned reflexes become more and more complicated in composition the farther they are removed from the end of the spinal cord toward the cerebral hemispheres. The complication is greatest in the part of the brain lying immediately underneath the hemispheres (the subcortical centers nearest to the cortex), the part which is specially directed to the external medium surrounding the organism. With this part of the brain are connected the most complex special unconditioned reflexes (food, sex, defense, *etc.*), which maintain the chief connections of the organism with the outer world. On the basis of the most recent experiments I find it justifiable to separate the above mentioned reflexes, together with the conditioned reflexes of the hemispheres, from the rest of the nervous activity under the special name of " the highest nervous activity." These reflexes always form one connected whole by which, thanks to the analysis and synthesis of the outer stimulations by the hemispheres, the minutest elements of nature, as well as their complexes, are brought into temporal, continually changing connection with the stereotyped activity of the nearest subcortical centers. In this way the most detailed and the most accurate equilibration of the organism with the medium is produced. The study of the mutual relation of these two highest parts of the brain must become one of the most important problems of the highest nervous activity, which in the first physiological treatment, so to speak, will be the subject of the present communication.

First of all the cortical conditioned reflexes are formed by means of the subcortical centers. A certain degree of excitability of these centers is the essential condition for the formation of the connection between cortical cells and subcortical centers. For instance, if the animal is already fed before the experiment, it is difficult or even impossible to form the conditioned reflexes on food. The same is true, of course, in regard to the other subcortical reflexes (sexual, defensive, *etc.*). Further, if the connection between these subcortical centers has been formed, their tonus is communicated to the cortical cells. When the dog is more hungry the magnitude of conditioned reflexes increases, and, on the contrary, decreases with the satiation of the animal. When the unconditioned reflexes of different kinds are used the conditioned agents which are equally strong acquire their respective strength from the strength of the unconditioned reflex. If the tonus of the subcortical centers remains constant and moderate, the magnitude of the conditioned reflex is accurately determined, up to a certain extent, by the exact amount of energy sent to the cortex by the external agent. Finally, the following especially interesting facts reveal themselves dependent on the subcortical centers. When the tonus of the subcortical centers is greatly increased, for instance in the case of increased excitability of the food center, the conditioned reflexes show a phase of equalization and a paradoxical phase, *i.e.* the strong and the weak agents produce an equal action, or the weak ones even become more effective. This phenomenon may be considered as a particular case of a general rule, viz., that in the cortex the limit of the functional expense of the cell is continually protected. As soon as the external stimulus exceeds the maximal limit, inhibition sets in and the excitability of the cells falls. In this particular case the high tonus of subcortical centers produces the same effect as an over-maximal stimulus. This fact is obviously a vital one, as it distorts the actual normal relations and furthermore gives a satisfactory explanation of hysteria.

On the other hand, the hemispheres should be characterized as having the highest reactivity, the highest lability of all the parts of the central nervous system (cf. the experiments with the short-timed suppression of blood circulation). Thus, with the aid of the hemispheres alone, the smallest changes in the surrounding medium may set in action the subcortical centers lying nearest to the hemispheres. In a similar way, because of the lability of the cortex, the external stimulation easily gives way to inhibition, a process which extends to the subcortical centers which are not in the same degree capable of being directly inhibited (cf. the experiments with the extinction of the investigating reflex on dogs with the hemispheres intact and on those without them). In the same manner the hypnotic states and sleep, being inhibitory phenomena extending over the nearest as well as over the remotest cortical centers, take their origin in the hemispheres. Under certain conditions, the inhibitory action of the hemispheres reaches such a degree that even the unconditioned stimuli become ineffective for the subcortical centers.

Consequently, we may state that the hemispheres act, in respect to the subcortical centers, sometimes as stimuli, sometimes as inhibitors, and in general as regulators of these centers. This action brings the subcortical apparatus, which is the most important for the relation of the organism with the outer world, being very strong but at the same time inert, into a detailed and accurate equilibrium with the conditions of this world. Conversely, the strength and the real significance of the activity of the hemispheres rests upon the activity of the nearest subcortical centers.

Richard H. Paynter. *Some Psychological Findings in Drug Addiction.*

This study was financed by the Committee on Drug Addictions through the Philadelphia Committee for the Clinical Study of Opium Addiction. The work was carried on at the Philadelphia General Hospital in coöperation with a staff composed of several physicians, nurses, and a psychologist. The problem is to compare the mental power of drug addicts under two different sets of conditions: when they are receiving morphin sulphate in the dosage that is necessary to keep them comfortable, and when they are completely deprived of the drug for a certain number of hours.

The subjects were twelve men who applied to the hospital for admission. They came from all walks of life with durations of addiction ranging from about one year to about twenty years. The tests employed included measures and observations on the subject's motor coördination, perceptual-motor processes, vocal responses, auditory-memory span, free and controlled associations, learning of new associations, reading ability, arithmetical reasoning, and intelligence. Every subject was given tests involving the above activities for two hours on each of three days when he was kept comfortable on morphin sulphate, and also for two hours on each of three days after he had been deprived of this drug from ten to twelve hours. Six subjects were examined when the comfortable period came first and the withdrawal period second, and six subjects were examined when the withdrawal period came first and the comfortable period second. Each subject was given the same test, a similar one or an alternative form, in the second period. Furthermore, after each test in the second period the subject was asked to state whether his performance was "better" or "poorer" (as regards speed, amount, and accuracy) than it was in the first period.

Although experiencing varying amounts of physical and mental distress during the withdrawal period of from ten to twelve hours, the subjects performed their tasks far better than was originally expected. There was no approach to the serious mental confusion and disintegration that was contemplated in view of the current opinions as to the psychological collapse resulting from sudden abstinence. In many instances in the withdrawal period the subjects did better than they themselves judged, and at times they performed even better than in the comfortable period. In the withdrawal period the subjects often tend to underestimate their mental efficiency, whereas in the comfortable period they often tend to overestimate it.

L. A. PECHSTEIN. *Whole* vs. *Part Learning in Relation to Practice.*

Following a complete summary of the present status of experimental work relative to whole *vs.* part learning, a report is made of an extensive investigation just completed. This research involved the use of a number of adult subjects, who learned successive lists of nonsense syllables, controlled as to length, difficulty, *etc.,* with each subject running through several rounds of carefully controlled 'whole,' 'pure-part,' and 'modified-part' methods. The final results, with practice carried to a fixed limit, show that significant differences as to method appear in the first round, but that these differences are significantly eliminated as practice proceeds; that subjects do as well by one method as any other when they become thoroughly experienced with the type of learning involved in learning nonsense syllables *verbatim.*

T. PERKINS, see R. H. WHEELER.

JOSEPH PETERSON. *The Measurement of Beliefs of College Students.*

Twenty-four simple statements, covering various fields of experience and study, were ranked by 48 college students who were mostly sophomores. The ranking was done by first rating each statement on a credibility scale of 1 (highest value) to 7, and then ranking in order the items of each group rated "1," "2," "3," . . . "7." This gives a continuous ranking in order from most to least credible. By this simple and orderly method greater accuracy than otherwise was assured. Some of the statements were: " I shall exist as a person with a personal memory after death." " In the summer of [the next summer] the temperature in Nashville will sometime be as high as 86° F." " Bacon wrote the so-called Shakespearean plays." " I who read this shall live to be ninety years old." " Christ was actually resurrected from the dead." " If you put a lighted match over an open bottle of mixed hydrogen and oxygen there will be an explosion."

Results are organized to show the mean rank and the standard deviation of the distribution of the ranks of each statement, and, from the mean of the ranks, the ranking by all the students combined of the 24 statements according to credibility. A marked lack of conformity to rigidly objective facts (or probabilities) is evident, even though the subjects were asked not to sign their names. While this result is due partly to ignorance regarding certain of the data, the results in general show that group indoctrination and tradition weigh heavily in influencing judgments as to truth. Subjects representing different religious groups show different modal tendencies. Direct reactions to objective conditions are not easy to obtain even under conditions of anonymity.

The method is considered in relation to its possibilities as a means of measuring behavior results of instruction in the sciences. No general credibility scale is yet constructed but the values of such a scale for use in different school-groups is considered.

A simple formula for measuring the discriminability of different sorts of material—weights, beliefs, advertisements, goodness of handwriting, *etc.*—is offered, as well as one for the P.E. of the measured discriminability. An experimental method of measuring the discriminability of different sorts of material, as well as the discrimination ability of different groups of subjects, has obviously much social value.

JOSEPH PETERSON and L. W. ALLISON. *Controls of the Eye-Wink Mechanism.*

The eye-wink mechanism is important in psychology because of (1) its easy observation and recording possibilities by objective means, (2) its great susceptibility to influence by various social as well as mechanical stimuli, and (3) its variety of controls which throw light on the different 'levels' of reaction. Its main control is doubtless autonomic (or 'central'), like that of breathing, but the blinking rate and regularity are influenced by various external stimuli through local reflex mechanisms, as well as by more general bodily changes, as in emotional disturbances and certain postures or sets. It is also controlled 'voluntarily,' or by direct social stimuli, as when one, on being asked to do so, winks as rapidly as possible for a given period or inhibits blinking. That this latter type of control is somewhat different from others is evident from the rôle that language mechanisms play in it. It occurs only when certain stimuli are operating directly or by the mediation of certain associative and interactive processes, both of which may be very complicated. Such interferences with normal blinking seem never to originate 'spontaneously.'

Preliminary experiments show that several persons may silently count the blinking of one individual with a high degree of agreement. This method is useful in cases of investigating the blinking when the subject is to be left as free as possible from social influences and certain artificial conditions. It is serviceable when the subjects are young children or animals. To get the actual inter-blink periods a simple electric recording device is essential. By such means we have obtained reliable differences in responses by the same subjects under different conditions of mental occupation—as reading, cancellation of letters, *etc.* Under instructions to "wink as fast as you can till signaled to stop," a marked regularity in rate occurs, reminding one of Sherrington's scratch-reflex in dogs. The mean from nine subjects through ten periods of ten seconds each, with rests between each period, is 3.72 ± .13 winks per second (inter-wink periods of 0.266 ± .006). Rates for the different subjects vary, ranging from 2.54 to 4.84 (P.E. = 0.40) winks per second, but the rate is remarkably constant for each individual and rank correlations through the different periods are high. The coefficients of variability of the nine subjects, through the ten periods of 100 seconds, are 0.09, 0.17, 0.08, 0.12, 0.13, 0.15, and 0.05 (mean = 0.11).

JOSEPH PETERSON and W. F. SMITH. *Habituation Effects of the Equally Tempered Musical Scale.*

The equally tempered scale is a compromise which, for practical convenience, violates some of the principles of harmony. Does habituation to it result in any degree of tolerance for mistunement of intervals in just temperament? This is an experimental problem which can be investigated independently of theories of consonance and in accordance with the empirically established fact that certain intervals of simple ratio have as far as practicable been given preference in musical usage over other intervals. This preference is shown in melodies, even though it has been somewhat compromised in modern harmony.

The method used was to sound before the subject a series of four consonant intervals, one of which each time was altered (augmented or diminished) by a pre-determined number of vibrations per second. The interval to be changed at any given time was determined by a chance schedule. The subject indicated each time by writing a number—" 3," " 4," " 5," or " 6 "—which interval seemed to him to be " changed or slightly unnatural." Eighteen musically trained and eighteen untrained college students served as subjects, each one rendering 380 judgments.

Results show that the musically trained subjects detect more readily augmentations of intervals in the justly tempered scale which are diminished in the equally tempered scale, and diminutions of those which are augmented in this scale. This tendency is less clear and constant in the case of the non-musical subjects. The results indicate a tolerance by musical subjects for mistunement of justly tempered intervals in the direction of habituation to the equally tempered scale. Consonance theories must evidently take note of habituation effects, which in this field have remarkable similarity to effects of habituation to visual patterns in well known cases of illusions of orientation. In such illusions

the subjects may see streets, contrary to fact, as if they followed the cardinal points of direction, or they may see streets which do follow the cardinal points as if they were slightly out by a degree approximately equal to that to which they have become habituated. Our present results seem to agree with those by Meyer on quarter-tone music and those by H. T. Moore, even though no two of these three investigations employed the same method.

JEAN PIAGET. *Le parallélisme entre la logique et la morale chez l'enfant.*

Nous voudrions montrer brièvement que l'acquisition des notions morales, chez l'enfant, s'opère selon un processus très comparable à celui qui caractérise le développement logique.

En ce qui concerne la logique de l'enfant, nous avons cru pouvoir établir les 3 points suivants:

1. La logique spontanée de l'enfant diffère de celle de l'adulte parce que l'enfant est *égocentrique*. L'égocentrisme enfantin, qui s'observe dans le langage et la vie sociale des enfants, n'est pas une conduite asociale mais un état d'indifférenciation entre le social et l'individuel pur. L'égocentrisme aboutit en logique à des conséquences systématiques: difficultée à manier le jugement de relation, *etc.*

2. La *contrainte* adulte n'abolit pas l'égocentrisme: ses résultats se superposent à ceux de l'égocentrisme sans les transformer. Exemple: le verbalisme scolaire.

3. La *coopération* seule conduit à la logique.

En ce qui concerne la morale, nous retrouvons les mêmes phénomènes:

1. L'attitude morale spontanée de l'enfant consiste en un mélange de réactions sociales élémentaires et de réactions égocentriques. Cette attitude ignore donc toute règle morale et tout devoir particulier.

2. Le respect de l'enfant pour les consignes adultes est source de la conscience d'obligation (Bovet). Mais cette conscience primitive du devoir ne suffit pas d'emblée à refouler l'attitude égocentrique: l'enfant adopte une conduite intermédiaire (réalisme moral).

3. La coopération seule conduit à la conscience morale autonome.

HENRI PIÉRON. *Douleur et sensation.*

Doctrine classique: la douleur est une sensation soumise à la loi de spécificité de J. Müller. Accord sur ce point, même entre von Frey (dissociation complète des systèmes tactile et algique) et Goldscheider (coloration douloureuse du tact provoquée par pression faible en certains points, forte en d'autres).

Peut-on ranger dans un système spécifique à qualité unique, comme le chaud ou le froid, des piqûres, pincements, brûlures, coliques, céphalées, ou rages de dent?

En fait, il y a dissociation actuelle des douleurs cutanées établie même par des élèves de Von Frey, entre douleurs claire et sourde (le " ligypathique " et le " barypathique " de Schriever, reprenant la différenciation d'Alrutz), entre brûlure et piqûre (Rein).

Les expériences naturelles de la pathologie nerveuse (névrites, lésions des voies bulbo-médullaires) établissent que des systèmes cutanés différents répondent à: piqûre, pincement, et brûlure.

L'excitabilité douloureuse viscérale est d'autre part bien établie, avec innervation afférente autonome (la douleur d'excitation sympathique étant prouvée, en expérimentation humaine, par Leriche).

Le terme douleur s'applique donc à des systèmes spécifiques différents, lorsque les sensations comportent une forte réaction affective thalamique, le spécificité différente relevant de l'élément perceptif cortical. Il y a douleur quand la réaction affective atteint un niveau émotionnel, ce qui ne se produit pas chez les animaux inférieurs (d'où Sharpey Shafer conclut que la douleur est une sensation phylogénétiquement tardive, et rejette l'expression " protopathique " de Head, alors que, c'est seulement le niveau douloureux de la réaction protopathique qui est tardif).

Le niveau douloureux n'est pas atteint pour toute une série de systèmes récepteurs (les réactions perceptives et affectives se montrant en antagonisme) ; il l'est, très juste, pour la piqûre, qui a encore un coefficient perceptif élevé (localisation, discrimination spatiale, et sensibilité différentielle fines, latence brève, adaptation) ; le réflex psycho-galvanique disparaît vite par répétition des piqûres, et il existe une " piquomanie " qui n'est pas de l' " algophilie," mais seulement de la " centophilie."

Ce niveau est au contraire très largement atteint pour la brûlure,—probablement conduite par des fibres amyéliniques à conduction lente,— de localisation diffuse, et de latence longue, exaspérée par répétition, angoissante (à forte et constante réaction psycho-galvanique).

La douleur doit désigner un niveau émotionnel de réaction affective atteint seulement par stimulation de certains systèmes de sensibilité spécifique, et il n'y a pas une " sensation de douleur," mais diverses formes de sensations à caractère douloureux. Les études classiques relatives au " sens de la douleur " dues en particulier à l'école de Von Frey, concernent en réalité un sens cutané spécifique bien défini, de type " épicritique," le sens de la piqûre, qui renseigne particulièrement sur le caractère " pointu " des objets.

Henri Piéron. *Le syncrétisme perceptif dans le mécanisme du réflexe conditionnel.*

Dans l'expression théorique des faits relatifs aux réflexes conditionnels, Pavlov fait appel à un mécanisme essentiellement analytique.

Soit un excitant lumineux, L, provoquant la salivation après associations répétés à la poudre de viande. L'addition d'un son de diapason, S, à L diminue l'action du dernier stimulus. Si on répète L + S, sans association à la poudre de viande, S devient inhibiteur conditionnel et arrivera à annuler complètement l'action de L. À ce moment, l'addition du bruit d'un métronome, M, à L diminue l'action salivaire de la lumière, et, à L + S, ou confère une bien faible action salivaire, ou n'agit pas. Mais, si on associe la poudre de viande à L + S + M, au bout d'un temps suffisant, on obtient une salivation aussi grande qu'avec L seul : M a inhibé l'inhibiteur, S, a désenrayé le mécanisme de freinage, et a pris même valeur excitatrice, car M seul provoque une certaine salivation ; mais, chose étrange, que Pavlov renonce à expliquer, S + M a la même action salivaire que M seul, en sorte que S, inhibiteur conditionnel, quand il se trouve en relation avec L, ne l'est plus quand il se trouve en relation avec M.

La théorie de Pavlov se heurte là à une difficulté fondamentale.

En realité, une expression satisfaisante des faits s'obtient quand on rapproche ceux-ci des données relatives au mécanisme de recéption syncrétique caractérisant la perception.

L provoque la salivation, comme associé à la poudre de viande dont il est le signe précurseur ; L + S devient un précurseur moins sûr, et d'action plus faible. La répétition du complex L + S, sans poudre de viande, l'individualise en une perception de valeur négative. L'addition de M trouble cette individualisation perceptive. Puis l'association à la poudre de viande de L + S + M, confère à ce complexe perceptif valeur décisive de signe précurseur.

En l'absence d'expériences répétées (donnant à la perception valeur positive de signe précurseur, ou au contraire valeur négative certaine) M agit comme élément du complexe L + S + M, et S + M également (un élément d'un complexe syncrétique tendant à prendre valeur de l'ensemble, quand il n'acquiert pas une signification perceptive propre et distincte).

Le complexe L + S constitue une individualité perceptive qui a un sens négatif défini, et la répétition de M + S, sans poudre de viande, donnerait à ce complexe une même valeur. Mais, en l'absence d'expérience, il agit comme fragment du complexe L + M + S, précurseur de la poudre de viande, mais moins assuré.

Cette expression des faits est cohérente, en accord avec les données sur les mécanismes récepteurs, et évite la complication de la notion d'inhibition de l'inhibition, qui obligerait, avec la complication croissante des ensembles excitateurs, d'envisager une inhibition de l'inhibiteur d'inhibition, une contre-inhibition de cette dernière, et ainsi de suite indéfiniment.

On peut rendre compte de toute une série de données relatives aux réflexes conditionnels, en faisant appel aux lois fondamentales de la perception que j'ai tenté de formuler.[1]

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[1] H. Piéron, Les problèmes de la perception et la psychophysiologie, *Année psychol.*, 27, 1927, 1–22.

Zygmunt Pietrowski. *Freudian Causation.*

The student of Freudian psychoanalysis is struck by two things. On the one hand, psychoanalysis has explained a variety of phenomena and has indicated a method for possible future research, while at the same time it defends views which are obviously in contradiction to modern psychological experience. On the other hand, both the assumptions contradicted by scientific experience and those which seem to be substantiated by clinical experience, form an organized theoretical system, coherent when interpreted within itself. For Freud always adheres closely to his assumptions and draws his conclusions from them in a logical manner.

In the light of this there arises the question of why certain conclusions of Freud are incompatible with current psychological experience, while others are not. To answer this question we must attempt to discover whether the errors of Freud are due to conclusions drawn illogically or to an erroneous set of assumptions.

An examination of Freud's theory in the light of modern psychological discoveries would tend to disclose those parts of Freud's system in which he tends to withdraw from reality in order to retain the logic of his theoretical structure. Besides, it would tend to set the limits of psychological facts discussed and included by Freud, as well as describe his method of verification and its relation to psychological research in general.

The theory of Freud is not inclusive enough to describe the total behavior of the individual. No less is it interesting, however, as an attempt to bring into the realm of psychological analysis those methodological concepts which have aided so phenomenally the growth of physics. This quantitative aspect of the physical sciences has been an important influencing factor in Freud's formulation of his theories of the subconscious, the libido and psychical causation in general.

The major part of the paper attempts to analyze carefully and precisely some of the reasons for the failure of Freud to bring into psychology these methods, analogous to physical methods.

Further it attempts to compare the Freudian concepts of behavior causation with those of behaviorism and *Gestaltpsychologie*. Each of these theories expresses within the limits set by itself the causation of psychological events. The reason for this is a varying point of view and, what may be even more important, a varying subject-matter of investigation. The various theories limit themselves to the description only of certain events.

This result explains the wide disparity between these various approaches and shows that Freudian causation, if erroneous in certain respects, is due, not to an illogical development of the primary assumptions, but to a faulty approach based on the concept of the libido as the universal psychological causal factor.

W. B. PILLSBURY. *The Immediately Given for Psychology.*

Psychology is blest with a great diversity of explanations. What is not so obvious is that it also shows great differences in the assumptions as to what it is that is directly given, without differentiating between what is supposed to be immediate and what an explanation. To determine clearly what is directly known may be an advance.

At least two directly opposed assumptions as to where we must start are prevalent. One believes that we know directly the mental process within, and Hume denies that we know anything more. The man in the street probably believes that we know directly the object outside, and the modern behaviorist insists that we know nothing else. There must be something in common.

Both are at one in asserting that we know. It it be a man's act that is observed, the thing known is one, but the attitude taken towards it is twofold. Objectively it is the function of the man acting; subjectively the knowing is a function of the observing individual. Both functions are phases of the same process, because, for the observer, the act exists only as it is known. A complete explanation of the act involves its observation and its connection with other acts. They are closely connected, although as functions they belong to different individuals and are different functions. I contend that they are equally important, and that one cannot ignore the knowing function.

The act is, and must be treated as, a function of the organism as a whole. To that interpretation we have nothing here to add. The knowing function is to be interpreted in another way as a function of what we call the 'mental,' speaking roughly. The mental is known directly only as a function. That we know, is more immediate than sensation or idea or other so-called mental structures. That one is angry or has an intention is also a function and more immediate than organic sensations or than recorded bodily changes.

The explanation of the functions of knowing, becoming angry, or developing intentions, must come through reference to other specfically observed functions, by connecting them with mental structures, where we can be assured of these, by relating them to the nervous system and other bodily structures. When completely explained they connect with the outward active functions of the body, as observed by some one else. At that point our two functions become interconnected, and instead of two functions we have one, or two phases of the same event. At the moment we are concerned not with the explanation but with the starting point. We insist that the known is always function, but would add that the function of knowing is just as much a psychological problem as is the function of doing, which has had all of the emphasis recently.

R. PINTNER. *Non-Language Tests.*

Intelligence tests at the present time are predominantly verbal and scholastic. Verbal and scholastic tests are valuable, but we should, in addition, develop non-verbal and non-language tests. Intelligence may show itself in other types of reaction in addition to those primarily concerned with words and verbal responses. It might be well to call 'non-verbal' those tests which do not require verbal responses on the part of the subject taking the test, but which use language in the directions and explanations given by the examiner; 'non-language' tests would then be those tests which do not use language in the directions and in addition have no verbal content. The directions for non-language tests are given by means of examples and pantomime.

In America the need for non-language tests is very great for comparing children coming from homes with varying degrees of familiarity with the English language. It is futile to go on giving group verbal tests, such as the National Intelligence Tests; to Italians, Slavs, Indians and Mexicans in our schools, and then to try to make allowances for the language handicap. In measuring the mental ability of the deaf, the non-language test is the only kind of test that can be used. In comparing different racial groups in foreign countries, non-language tests are the only possible means of comparison. Translations of tests cannot be used.

M. Ponzo. *Fenomeni di annullamento percettivo con stimoli sopraliminali.*

Nella determinazione dei valori della soglia di differenza muscolo-cutanea usando pesi molto al di sopra della soglia, è possibile diminuire questi in modo continuativo con il seguente dispositivo assai semplice.[1] Da una boccia tenuta in mano (a braccio sciolto) dal soggetto e contenente dell' acqua, questa può venire sottratta lentamente per mezzo di un tubo di deflusso. In tali condizioni spesso, in un dato momento, si vive l'impressione dell' annullamento completo del peso sostenuto dalla mano.

Per la tendenza del dinamismo psichico ad una interpretazione intuitiva sintetizzante dell' avvenimento percettivo tale annullamento può venire apprezzato come un movimento di sollevamento della mano che tiene afferrata la boccia. Questa interpretazione si trova facilitata da lievi movimenti della mano, ma permane anche quando si escluda, nei limiti del possibile, ogni movimento involontario di questa.

Il fenomeno, che è suscettibile di numerose varianti, da luogo ad interessanti considerazioni sulle sue causali, che rimangono in parte oscure. Si notano in esso delle affinità anche con i movimenti automatici, descritti da Salmon e da Kohnstamm, che seguono normalmente certi sforzi musculari. Può essere spiegato, a parer mio, come un aderire del soggetto all' impressione totalitaria di partenza, che ad un tratto viene a mancare, prima cioè del momento in cui sorga una nuova impressione di peso, chiaramente diversa da quella antecedente.

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[1] Sull utilizzazione di questo dispositivo in psicotecnica per la valutazione di differenza di pressione, di sforzo e di temperatura vedasi la mia Nota illustrativa di particolari dispositivi e apparecchi usati in ricerche condotte nell Istituto di Psicologia di Torino, *Archivio italiano di Psicologia,* 6, 1928; e nel mio volume *Alla ricerca delle attitudini nei giovani,* 1929.

Il fenomeno sta anche a provare la profonda diversità degli avvenimenti nella determinazione della soglia di differenza col metodo dell' aumento e con quello della diminuzione dello stimolo. Infatti esso non si verifica con gli aumenti continuativi del peso.

M. Ponzo. *Principi componenti e concomitanti del dinamismo psichico nella ricerche della Scuola di Psicologia di Torino.*

Durante lo stato veglia, domina in ogni avvenimento psichico dal più semplice al più complesso, un fattore che noi viviamo come una forza, che sentiamo come un dinamismo potenziale interiore, il quale spesso si accomuna con uno stato di tensione motoria.

Noi tendiamo a riconoscere in esso l'affinità con il lato sentimentale della vita (Kiesow).

È difficile stabilire i suoi confini verso i processi volitivi, con i quali si confonde in sfumature innumeri. Può affermarsi solo che, mentre si accentua nell' ambito degli avvenimenti psichici consapevolmente governati verso un fine, sussiste e persiste fuori dell' ambito di questi.

Esso ora appare più intenso, ora più tenue; presenta remissioni o rialzi a sbalzi irregolari. Talora sembra permanga da solo nella coscienza.[1]

Anche là dove soggettivamente questo dinamismo pare esistere soltanto dal lato psichico, come nei processi di pensiero, sono dimostrabili le sue manifestazioni tenui, ma costanti e significative, nelle concomitanti motorie.[2]

L'analisi dei processi, dei quali il dinamismo psichico appare costituire la molla necessaria per lo sviluppo, sta a dimostrare di frequente come in esso siano riposte tendenze che si svolgono secondo direttive a carattere finalistico. Ciò è appurabile con particolare chiarezza nello svolgimento di funzioni sensoriali, nelle quali la successione delle fasi tende alla più perfetta valorizzazione degli avvenimenti percettivi ai fini della conservazione individuale. È questa la zona in cui le tendenze insite nel dinamismo animatore dell' atto percettivo si dimostrano più affini a certe forme di atti istintivi.[3]

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[1] Ponzo, Reazioni verbali di integrazione.

[2] Ponzo, Le concomitanti motorie di stati di attività psichica.

La tendenza finalistica del dinamismo psichico riappare nella constatazione che la maggioranza dei processi percettivi perviene ad una conclusione sintetizzante (Kiesow, Chinaglia, Ponzo).

Ciò si avvera a volte anche dove questa risulta profondamente discordante dalla realtà oggettiva, nota per altra via anticipatamente al soggetto: così nel raddoppiamento di un singolo oggetto o nell' unificazione di due oggetti nei processi percettivi tattili (Ponzo).

Mentre di solito la tendenza sintetizzante del dinamismo psichico prevale su ogni altra, in particolari condizioni possono rivelarsi tendenze antagoniste, le quali, pur dovendosi ammettere come costanti, abitualmente rimangono nell' ombra: tra queste va menzionata la tendenza dissociante (*analizzante, disintegrante*), la quale nel processo percettivo mette sopratutto in valore le parti.[4]

Là dove questa gara delle tendenze contrastanti non è afferrabile nel suo decorso, è tuttavia affermabile nelle sue risultanti, che appaiono essere l'effetto della lotta delle singole tendenze: così negli apprezzamenti intuitivi di quantità la tendenza sintetizzante è raffrenata da quella dissociante, la quale pone in rilievo il valore dei singoli elementi della collettività e i rapporti fra questi ultimi (Ponzo).

Anche nei processi di localizzazione di impressioni cutanee il modificarsi di una componente qualitativa sensoriale determina la variazione della grandezza dell' errore nei processi di localizzazione (Ponzo, Kiesow).

Nelle sue varie manifestazioni il dinamismo psichico tende a svolgersi secondo le direttive della massima economia (Gatti) e quindi secondo quelle del minimo sforzo.

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[3] Ponzo, Rapporti fra dati fisici e psichici negli atti gustativi e olfattivi; Significato dei moti oculari dei ciechi nella localizzazione dei suoni.

[4] Kiesow, Principio dell' indipendenza nella lotta fra i campi visivi; Ponzo, Fenomeni di gara nel dominio tattile.

Con ciò sta in rapporto:

a. La tendenza di avvenimenti psichici a svolgersi ed a persistere nelle stesse forme di accomodamento dinamico rappresentativo,[5] o rappresentativo-motorio.[6]

b. La scarsa o nulla influenza modificatrice dell' esercizio su funzioni da lungo tempo automatizzate (Ponzo, Kiesow).

Contrasta tuttavia al prevalere assoluto di queste tendenze del dinamismo psichico a rinnovarsi nelle forme consuete e con un minimo dispendio di energia il dominio consapevole dei compiti e dei fini da raggiungere nel campo dei processi volitivi, il quale reca con sè la possibilità di sviluppi nuovi.

JAMES P. PORTER and H. A. COPELAND. *Association and Psychogalvanic Responses during Early Adolescence.*

Thus far we have experimented with approximately ten of each sex within two months of their birthdays from the ages eleven to seventeen inclusive. Our subjects have come in about equal numbers from rural and city schools. The fifteen stimulus words were the same as those used by Porter in an earlier study. The Hathaway psychogalvanic reflex apparatus was employed to record the emotional responses.

Association reaction times appear to decrease gradually with age and to vary positively and at least significantly with the frequency which Thorndike has reported for these words in his *Word Book.* The r's (Ayres' formula) are all around 0.70. This close relationship is at least surprising if we keep in mind the sources used by Thorndike in making up his word list.

The psychogalvanic measures of emotional responses show increase from eleven to seventeen but such increase is not marked. Variability is so great that from our small number of subjects we have not attempted to determine statistically the changes at

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[5] Ponzo, Concordanze e discordanze nelle raffigurazioni collettive; Direttive collettive nelle testimonianze.

[6] Ponzo, Perseverazione di contenuti rappresentativi e di atteggiamenti motori; Interpretazioni percettive di consuetudine.

chronological age levels. Younger subjects more often give phrase responses instead of single words. Similarity of word responses at all ages is found and, when checked against the 'common reactions' of the Kent-Rosanoff list, shows for some of our stimulus-words a much higher percentage of such responses than has been reported by these authors. At age eleven, girls give a weaker psychogalvanic response with most of the stimulus-words than do the boys. At age fourteen, the medians of the psychogalvanic readings for the boys are indicative of an increase in emotional responses. At the older ages, up to and including seventeen, the psychogalvanic medians show greater emotional responses for the girls. Porter's findings with college freshmen, men and women, also revealed a more marked psychogalvanic response in women. Should further investigation reveal in girls and young women a change from a smaller to larger emotional response from eleven to eighteen years, when compared with boys and young men, at least some revisions of commonly accepted theories of adolescent growth changes and sex-differences may be necessary.

CARROLL C. PRATT. *Schopenhauer's Theory of Music.*

"Music stands alone, quite cut off from all the other arts. In it we do not recognize the copy or repetition of any Idea of existence in the world. It is thus by no means like the other arts, the copy of the Ideas, but the *copy of the will itself*." In these words of Schopenhauer from the famous sections on art we find the substance of a theory of music which, in spite of its sententious and even fantastic character, has frequently commended itself to students of aesthetics.

When one tone follows another tone the interval between the two is not filled by mere nothingness. Within the experience there is a something which we recognize with all assurance as a movement. When the tones are formed into the patterns of melody, harmony, and rhythm the whole structure is suffused with manifold varieties of movement, so that it is no mere figure of speech to say that the sounds of music 'rise' and 'fall,' 'soar' and ' droop,' ' leap ' and ' bound,' ' surge ' and ' tumble.' ' quiver ' and ' flutter,' ' throb ' and ' pulsate.' Such phrases are descriptive of certain phenomenal properties which are spread out directly in the musical experience. But so do our own bodies and the bodies of other people, when giving expression to certain states of mind, ' rise ' and ' fall,' ' throb ' and ' pulsate.' Hence it is only one step along the continuum of psychological meaning which leads us to find in the ceaseless activity of music the longing, wistfulness, harshness, and weakness which we discover in our own active lives and perceive in the activities of others.

The will, if one follows descriptions such as those given by William James, appears to consist almost exclusively of ideas of movements which have been deposited in the memory from previous involuntary performance. The burden of the present interpretation of Schopenhauer is that, owing to the many kinds of movement which are perceived immediately in shifting auditory structures, musical experience tends to assume many of the characteristics which pertain to those movements with which everyone is most intimate and familiar, viz., the movements of the human body which, in turn, are very frequently the consequence of those ideas of movement which James insists are forerunners of voluntary action. Hence it comes about that music, more nearly than any of the other arts, may be looked upon as a *copy of the will itself*.

S. L. Pressey. *Oral Examinations and the Comprehensive Written Examination for Graduate Degrees in Psychology.*

The paper first reports an attempt to determine the adequacy of oral examination by committee. At the end of a graduate course in psychology the graduate students in the course were divided into six committees each of five members. To each committee was added one person who had never had the course, to serve as a " Graduate Council representative," such as is common in many universities. Upon the morning set for the experiment one member of each committee was designated as the candidate and one as the chairman, and each candidate was examined by three committees successively, each examination lasting forty minutes. After each examination the candidate was rated by each member of each committee, first before and then after consultation. The results were then compared with reference to the following points: (a) amount of agreement or disagreement between different members of the same committee, before and after consultation, (b) amount of agreement or disagreement between different committees on the same candidate, (3) relation between committee ratings and each candidate's final grade in the course, the grade consisting of results on two written 'midterms,' a final written examination, and some class work.

To check on the adequacy of the comprehensive written examination five faculty members were asked each to present five questions for a comprehensive final doctorate written in educational psychology. From these questions, by chance selection, two examinations were made, which were then taken up by a group of candidates for the doctorate. The papers were then graded by four faculty members and several graduate students. The following points were considered: (a) agreement between judges in evaluation of each examination, (b) agreement between the two examinations taken by each candidate as evaluated by the pooled ratings of all the judges, and (c) agreement between each examination and total academic record of the student.

It is argued that adequate determination of professional capability is a very important matter. It is further pointed out that, in view of the increase in honors courses, and the use of comprehensive examinations, the larger problem is of general academic interest.

HANS PRINZHORN. *Die Bedeutung des metaphysischen Gegensatzes von Geist und Leben für die Psychologie der Persönlichkeit.*

Geschichtliches. Zwei Hauptströme führen zu der klaren radikalen Herausstellung dieses Urproblems durch *Klages:* in Frankreich von Buffon, Maine de Biran bis zu Bergson; in Deutschland von Hamann, Herder, Goethe über die romantische

Naturphilosophie (besonders C. G. Carus), und Nietzsche bis zu Klages.

Das Grundschema. Die organische Einheit des " Schlicht-aus-sich-Wachsenden," mit den Merkmalen: stetiges Urbild der Art, differenzierende Entwicklung, vollendete, geschlossene Gestalt der Individuen, ist nur fassbar als eine Polarität 'Leib-Seele,' worin die gesamte 'Wirklichkeit,' einschliesslich aller 'schöpferischen Kräfte' vorliegt. Der nur-menschliche *Geist* (= Bewusstsein + Wollen + Denken) ist *nicht* Produkt dieser Lebenseinheit, sondern eine ontologisch andersartige Macht, die zerspaltend einbricht. Dadurch fällt beim Menschen auseinander: Ich und Ding, Subjekt und Objekt, Begriff und Wesen. Aber sogar die Ur-Einheit von Leib und Seele wird zerrissen und in Feindschaft verwandelt, wobei 'der Geist' bald auf Seiten des entseelten Leibes kämpft (Materialismus) bald auf Seiten einer leiblosen Seelenfiktion (Idealismus).

Persönlichkeits-Psychologie. Die Fülle der beobachtbaren Sachverhalte lässt sich nur dann wirklichkeitsgemäss ordnen, wenn man die dramatische Spannung dieses Aufbau-Schemas erkennt und allen nur logischen Ordnungsversuchen gegenüber festhält. Die geschichtliche Bedeutung des Gesamtwerkes von Klages beruht darauf, dass er, unbeirrt von den mechanistischen und logistischen Tendenzen der Zeit, zuerst eine systematische Charakterkunde bis ins Detail ausgeführt hat, die aus einer bislang wenig verstandenen Ausdruckslehre erwachsen ist.[1]

HANS PRINZHORN. *Die Triebe und der Wille.*

Der Unterschied zwischen einer Triebhandlung (Nahrungsaufnahme, Wanderflug u. ä.) und einer Willenshandlung (Diät-Ernährung, Reise u. ä.) kann nicht gültig formuliert werden, ohne eine Willenstheorie, die das Essentielle dieses Unterschiedes trifft, dabei aber vermeidet, ein ethische Wertung als Beweismittel heranzuziehen. In diesem Sinne bedeutet die Willenslehre von Klages, die soeben als Band II seines Werkes, *Der Geist als*

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[1] Die metaphysischen Grundlagen dieser beiden Werke sind in dem soeben erschienen Hauptwerke niedergelegt: *Der Geist also Widersacher der Seele,* drei Bände, 1929.

Widersacher der Seele, erschienen ist, einen Markstein in der Geschichte der Psychologie. Zum ersten Mal wird hier ganz konsequent von der biologischen Ebene aus der hemmende, nur richtende geistige Akt des bewussten Zweckwollens gekennzeichnet als das, was er ist: eine von Grund auf andersartige Macht, als sämtliche Triebe, die man underscheiden könnte. Freilich setzt auch diese neue nur-menschliche Geist-Willens-Macht nur am triebhaften Vorgang an, aber mit Tendenzen, die im Triebbereich nicht vorkommen, obwohl sie von unserem Denken stets verfälschend hineinprojiziert worden sind. Die Grundtendenz kann vom Bios aus nur als negativ charakterisiert werden, damit aber ergibt sich die Möglichkeit, der Mannigfaltigkeit der Lebensvorgänge samt dem kulturellen Ueberbau, den der menschliche Geist errichtet hat, besser zu beschreiben, als bisher.

A. S. Raubenheimer. *The Effects of Rest-Periods on Learning-Curves in Typewriting.*

The purpose of the study was to ascertain (1) if speed in typewriting is increased, decreased, or apparently unaffected by rest periods; (2) if accuracy of typewriting is increased, decreased, or apparently unaffected by rest periods; (3) to what extent, if any, speed of typewriting is increased or decreased by rest periods of varying lengths; (4) to what extent, if any, accuracy of typewriting is increased or decreased by rest periods of varying lengths; (5) if differences exist in effects of rest-periods on speed of typewriting which are related to general intelligence as measured by Terman group tests; and (6) if differences exist in effects of rest-periods on accuracy of typewriting which are related to general intelligence as measured by Terman group tests.

Seventy-five students were given instruction in accordance with the Wiese-Coover system during fifty-five minute class periods. After a month of instruction, fifteen minute speed tests were given during the class periods. Records of the results of each test were kept in regard to gross number of words typed, number of errors, net number of words after deducting ten for each error, gross rate of strokes, net number of words per minute, and nature and character of practice, if any, between periods. Effects of two, four, six, and fourteen day rest-periods were observed.

Seven advanced students were studied in the same manner with a three-month rest-period added. The results indicate that rest-periods as such yield no beneficial gain. There is an increase in percentage of errors made. Casual, indiscriminate, and undirected practice invariably leads to harmful results, both in terms of rate and errors. At all times organized and systematic drill is to be preferred. Even with advanced students in typing, constant systematic practice is essential. There is no relation between sustained efficiency over a period of no practice and intelligence of the subject.

MARTIN L. REYMERT. *An Experimental Clarification of the Ontogenetic Development of Certain 'Concepts.'*

The present study discusses the general and specific results of three years of experimentation on the reactions of the growing child to simple geometrical forms.[1] The discussion is based on 9,552 separate sittings of 635 children from three to fifteen years of age from all available sources in a normal community, such as private homes, orphanages, day nurseries, kindergartens, and the public school system. The writer has endeavored, both in formulating the problem and laying out the method and procedure, as well as in the analysis of the results, to keep away from any preconceived notion of mental organization as presented by any 'school' or 'ism.' He presents the data with sidelights on now existing fundamental theories.

MARTIN L. REYMERT. *Qualitative and Quantitative Exploration of the Knox Cube Test.*

In support of the contention expressed and brought out in two earlier articles that the mental-test movement is in danger of losing itself in purely statistical refinement of standardization, while the qualitative aspects of the material measured is often entirely neglected, a simple test (the Knox cube test) was chosen for intensive exploration.[1]

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[1] Cf. a similar paper by the writer, Ontogenetic aspects of 'meaning,' *Proc. VIII Internat. Cong. Psychol.*, 1926, 393–396.

With the method and procedure standardized by R. Pintner, 50 children (aged 13–14) were tested eight times at two-week intervals and 100 adults (summer-school students, aged 22–30) five times at similar intervals. Some of the qualitative and quantitative results are as follows:

1. Under our experimental conditions this test correlates but little with itself from trial to trial (as shown by the rather great individual changes in Spearman ranks) for both children and adults.

2. The *first* trial (which is generally the only one taken in clinical work) is perhaps the most unreliable in regard to correct stable placement of an individual for this capacity.

3. *Learning* is clearly shown to take place from the first to the last trial, as is apparent from the average learning curves.

4. The children's *scores* were checked up by all available means of additional information and were compared with capacity in various other standard tests which presumably have relation to intelligent behavior, such as: Intelligence Test, Form A & B (Terman), The Multi-Mental Scale (McCall), Silent Reading Test (Gates), Standard Reasoning Test in Arithmetic (Monroe), Standardized General Survey Arithmetic Scale (Monroe), Imagination Test (Rorsbach). However, these scores showed little or no correlation with those other measures, a result which raises the question as to whether the test tests anything worth while at all.

5. From the experimental reports (checked also by reports from trained introspectionists) the qualitative aspects of this much used test, in regard to procedures employed for solving the task, are manifold and varied, and variation of method from

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[1] M. L. Reymert, The development of the verbal concept of relationship in early childhood, *Scand. Scient. Rev.*, 2, 1923, 32–83; Kvalitative faktorer i mental-maalninger (Qualitative factors in mental measurements), *Arkiv for psychologoi och pedagogik*, 1928, 27–38.

trial to trial in the same individual seems to be the rule rather than the exception for both children and adults.

6. Two or three typical procedures can be made out somewhat arbitrarily (vaco-motor counting, purely visual sensory memory, *etc.*), but the relation of these to excellency of capacity is obscure; the most superior method is probably "the organization of the cubes tapped into a pattern or unit" (recalled as a *whole*).

7. Case histories and verbal reports seem to bring out the great influence upon the scores of such factors as emotional set at the time of testing, varying ability to "keep the mind on the task" at different sittings, "good days and off days," former set habits of attention and accommodation for tackling tasks, inability of some intelligent individuals to take interest in so simple a task.

8. In spite of all these difficulties it might be true that the test, combined with other measures, would have some value in picking very low degrees of 'general ability,' but even here it would seem that some individual cases might be greatly misjudged, if a discriminative inquiry of a qualitative nature is not also employed.

CURT P. RICHTER. *The Galvanic Skin-Reflex in Spinal Animals.*

In the early days of the investigation of the 'psychogalvanic reflex' this phenomenon was thought to be dependent on the cerebral hemispheres. A few years ago, however, Schilf and Schuberth were able to show that it still occurred, not only in decorticated frogs, but also in animals in which the brain had been removed down to the lower third of the medulla. Some investigators have confirmed this work, but many others have failed in experiments involving more than the fore-brain. Accordingly, it has been the consensus of opinion up to the present that the mid-brain is essential for the manifestation of the psychogalvanic reflex.

However, we have found recently in numerous experiments that the reflex is still present in spinal cats with complete transections at any level of the cord. All previous investigations have been made on animals soon after operation. Hence the reflex has not been obtained because it is obscured in acute preparations by the high resistance of the skin. Several weeks after complete spinal transection the resistance decreases to a lower, more normal level, and the reflex is active again. In many instances it is more active than the normal; nevertheless, it is of the same general type as that obtained in the intact animal.

Curt P. Richter. *Thirst: A Function of Body-Surface.*

Thirst, as studied by the experimental method, is a complicated phenomenon in man, both because of the element of suggestion in the experiments and because of numerous popular fads and fancies regarding drinking habits. In animals, however, the introspective element is eliminated and the problem becomes much simpler. With water always available, their water-intake will be determined very largely, if not entirely, by the rate at which the thirst-sensation recurs, and will represent the actual volume of fluid required to satisfy the thirst. Accordingly, in current studies of thirst in the albino rat, our method has consisted simply in recording how much water the animals drink from day to day under given conditions.

Daily measurements of water-intake in 54 rats, from the time of weaning at 30 days to 500 days of age, have shown that the drinking habits are very regular and that the daily intake increases from 20 c.c. at 30 days to 35 c.c. at 500 days. Obviously this rate of consumption must be determined by the relative rates at which moisture is absorbed and given off by the tissues. It must be dependent, to some extent, therefore, on the actual tissue content of the body.

Efforts to correlate water-intake and body-weight have shown that the rates of increase in both are absolutely independent: the body-weight increases much more rapidly than the water-intake. On the other hand, an almost perfect correlation exists between water-intake and body-surface. At all ages, from 30 days, when the rat weighs only 30 grams, to 500 days, when it weighs 300 to 400 grams, it drinks daily approximately 800 c.c. of water per square meter of body-surface.

Definite measurements like those described above have never been made in man. It is interesting to note, however, that when this ratio is applied to man, with a surface area of 1.8 square meters, his daily water-intake is about 1,500 c.c., and this volume is generally accepted as the average intake of a normal adult.

EUGENIO RIGNANO. *Tendances affectives et instincts.*

À la suite de William James et surtout de William McDougall la " mode " prévaut aujourd'hui chez beaucoup de psychologues, surtout d'Amérique, de confondre sous le même nom " instincts " les instincts proprement dits et les tendances affectives. Nous croyons devoir nous opposer à cette terminologie, et non pas, certes, pour soulever une vide question de paroles, mais parce que appeler par un seul et même nom deux choses bien différentes ne peut pas manquer d'engendrer une grande confusion.

Trois phénomènes psychiques, en effet, tous les trois avec un caractère " conatif," doivent être bien distingués l'un de l'autre: *tendances affectives, réflexes acquis par habitude,* et *réflexes innés ou instincts.*

Limitons-nous à considérer ici seulement les tendances affectives élémentaires, desquelles ont ensuite origine, par composition, surtout dans l'homme, toutes les autres affectivités plus élevées, ou sentiments, susceptibles de nuances en nombre infini. Dans nos ouvrages *La mémoire biologique* et *Psychologie du raisonnement,* nous avons démontré l'origine et la nature mnémonique des tendances affectives fondamentales: elles dérivent, directement, de façon à en être autant de cas particuliers, de la tendance de chaque organisme à rester ou à retourner dans son état physiologique normal (tendance mnémonique elle aussi), ou bien représentent des accumulations spécifiques d'activités physiologiques du passé, qui tendent maintenant à se reproduire. Dans l'un et l'autre cas, elles constituent comme une force déterminant le but à atteindre, mais laissant indéterminée la route à suivre. C'est seulement quand une série de mouvements aura réussi, par hasard, le plus souvent après un nombre bien grand d'autres tentatives manquées, à ramener l'organisme à la fin désirée, c'est-à-dire dans les conditions ambiantes capables de satisfaire la tendance affective qui en ce moment meut l'organisme, c'est seulement *à partir de ce moment* que cette série de mouvements sera préférée aux autres, c'est-à-dire poussée à se produire par cette tendance affective: ce qu'on exprimera en disant que l'affectivité a opéré un ' choix.'

Si ces actes, ainsi ' choisis,' se reproduisent ensuite beaucoup de fois, ils se ' mécanisent ' peu à peu sous forme de réflexes ou de chaînes de réflexes, c'est-à-dire ils deviennent des *habitudes motrices,* que le stimulus respectif ne fait que ' déclencher,' et qui en arrivent à n'avoir même plus besoin, pour se produire, d'aucune tendance affective qui les ' pousse.'

Enfin, à la suite du continuel usage et de la consolidation graduelle qui s'ensuit de la structure neuro-motrice respective (qui contient ces actes pour ainsi dire à l'état potentiel, et qui n'exige, pour les produire, que l'action de certains stimuli externes ' déclencheurs '), celle-ci parvient à se transmettre, grâce à la transmissibilité des caractères acquis, aussi aux générations successives, dans lesquelles ces actes deviennent ainsi de vrais et propres *instincts,* c'est-à-dire des mouvements que la structure neuro-motrice héritée exécute automatiquement, sans besoin d'aucune expérience préalable directe, faite pendant sa vie par l'animal.

Le réflexe n'admet partant *qu'une seule solution;* au contraire,—avant qu'aucun des mouvements possibles n'ait été accompli par hasard et n'ait donné lieu à un ' choix,' ou quand des routes multiples et équivalentes entre elles s'offrent pour mener au but,—l'affectivité est susceptible *d'un nombre même très grand et indéfini de solutions.*

C'est cette possibilité de nombreuses solutions qui constitue ' l'imprévu,' ' l'antimécanisme ' du *behavior* affectif (et, partant, aussi de celui volitif), en comparaison du *behavior* préfixé et mécanique du réflexe ou de toute combinaison même complexe de réflexes, comme certains instincts.

Étant donnée cette différence fondamentale entre tendances affectives, d'une part, et réflexes acquis ou instincts hérités, de l'autre, l'usage du seul et même nom *d'instincts* pour les unes et

pour les autres ne peut que nuire, d'une façon très préjudiciable, à la clarté de toute description ou explication de la phénoménalité psychique.

Si par cette dénomination d' ' instincts ' on a voulu signifier que certaines tendances affectives sont elles aussi héréditaires ou innées,—comme c'est sans doute le cas pour toutes nos tendances affectives organiques les plus fondamentales,—qu'on les distingue alors, justement, en tendances affectives innées et tendances affectives acquises pendant la vie de l'individu, mais qu'on s'abstienne de leur donner un nom, qui désormais signifie, par consentement unanime, des phénomènes qui en sont aux antipodes.

SARAH M. RITTER. *Drug Addiction in China.*

This clinical study was made in coöperation with Dr. K. H. Li, Superintendent of the Soochow Hospital. Following a brief discussion of the causes of drug addiction and its symptoms, a description is given of the treatment, together with some psychological observations of the patients. Treatment consists of gradual reduction and sedatives, with psychological therapy. Various reasons are also given for failure of treatment.

A. A. ROBACK. *Writing Mistakes in the Normal and the Abnormal.*

A number of experiments on graphic lapses conducted at Harvard University under various conditions had yielded two outstanding results, viz., the tendency for a graphic habit to perseverate and the tendency for a symbol in writing to resemble another either before or, in anticipation, directly following it.

There were subsidiary phenomena of a less comprehensive scope which suggested the question whether abnormal subjects are susceptible to more and a greater variety of lapses in writing than are normal subjects.

A similar technique was followed at the Boston Psychopathic Hospital in order to compare the data. The general principles of perseveration and assimilation were borne out here, too, but, contrary to expectations, the psychopathic subjects did, on the whole, more regular work. The slips on the part of the normal subjects were of a greater variety, but nearly all were in the process of adaptation to the exigency of the task. The lapses on the part of the psychopathic subjects were at a more rudimentary level, without the purpose being at all detectable, except it be sheer changeability. There are certain characteristic slips for the incipient psychoses, such as the omission of certain letters, even at a somewhat slow speed.

A. A. Roback. *Meaning in Personality Manifestations.*

Much stress has been laid on the meaning of *personality* as a concept, but the manifestations of personality in habits and other forms of behavior have only recently begun to be interpreted in conjunction with the whole problem of motivation. There are three possible approaches to this study: (a) the behavioristic, which sees no meanings in the individual differences exhibited by different people, except as actually intended by the subjects or as representing the automatic effects of a pure conditioning to stimuli; (b) the psychoanalytic, which derives all the significance from certain experiences of an emotional nature undergone in early childhood; and (c), which for want of a better name I might call the 'constitutional' avenue. The stand taken here is that we are all so constituted (not only because of organ-inferiority) as to express our personality in everything we do, which is at all a deviation from a rational standard. Experiential effects may graft themselves on, or modify, the original foundation, but they are never the sole determining factors.

The meanings are to be sought not only in idiosyncrasies and eccentricities, but in gesture, posture, gait, vocal inflection and modulation, as well as the higher personality syntheses such as the recurring phrases or ideas in Shakespeare's plays or Beethoven's and Bach's compositions. Nervous tricks, like blinking, heaving the shoulders, see-sawing the legs, are also to be ascribed to a personality meaning.

Carl G. Carus had already paved the way for such a symbolic conception of personality about a hundred years ago, but all his efforts were concentrated on the *anatomical structure* and its meaning, bringing him perilously near the phrenological camp. The psychological stage of this procedure must include every manifestation of behavior. Thus, holding the head at a certain angle, photophobia, and the tendency to procrastination or to arrive somewhere too early, are all to be explained in terms of personality complexes, although not necessarily along Freudian lines. Undoubtedly some of these manifestations are betrayals of inner tendencies, others are compensations, and still others are the resultants of the interplay of circumstances and the organism (conflict).

The unfolding of these behavior meanings will be of great significance, not only in interpreting the lives of historic figures, but in the treatment of social, educational, and professional problems. Once it is recognized that it is not a matter of mere habit, when, to take one instance, one individual crosses his hands behind his back, another holds them in his pockets, a third folds them in front, a fourth holds the right arm flexed while walking, *etc.,* the components of our personality pattern become more intelligible.

Methods of investigation suggest themselves as (a) experimental (inducing various habits), (b) correlational and statistical (questionnaire and biographical material), (c) introspective and retrospective (genetic), and (d) restrictedly psychoanalytic, but controlled as to inferences.

EDWARD S. ROBINSON. *The Present Position of the Concept of Association.*

In his theoretical undertakings the psychologist has ever yearned to discover some simple principle with which to eliminate by a sweeping, deductive movement all of the disheartening uncertainties of his persistently uncertain domain. The conception of association is one of many notions that have fallen short in the Gargantuan rôle. This is small reason, however, for neglecting to deal constructively with a theory which even in this enlightened age is capable of a substantial intellectual service.

In order that the valid central core of the conception of association may be clear, it is desirable that we distinguish those assumptions and doctrines which have been incidental rather than essential features of the conception. It can be shown that association has at times been regarded as a force in the sense in which force was thought of in a now outgrown physics. It can be shown that at times there has been a belief that some kind of awareness of relation is requisite for associative connection. But, considering the fact that no competent psychologist is today likely to accept either of these beliefs, they hardly constitute such temptations to error that the theory with which they have been connected should be discarded.

The conception of association would also be placed in a more favorable position if the factual elements of the conception were kept distinct from those that are largely speculative. The theory of association does not, as is frequently assumed, stand or fall according to whether the ultimate units involved in association are ideas or reflexes or neurones.

Nor does the final fate of the theory of association depend upon our ability to reduce all of the so-called ' laws of association ' to one or two most fundamental laws. Arguments as to the relative importance of *contiguity, similarity, frequency, context,* and *consequences* have accomplished little. What is called for is an open-minded, yet critical, description of all of those variables that seem to be related to strength of associative connection and, along with such descriptions, experimental investigation of the more important of these influences. If such a program should lead to the discovery that the conditions of association are complicated, it can only be because the facts of mental life are actually complex. One may find comfort in traveling the broad, smooth highways of a fictitious mind, but in that case one must be content to arrive at a fictitious destination.

W. W. Rogers. *Controlled Observations on the Behavior of Kittens Towards Rats.*

These observations were on a litter of five kittens, three of which were kept with young white rats from six to ten hours every day from birth until five months of age, and two of which were placed with young white rats for fifteen minutes once a week for the same length of time. Some of the most noticeable of the tendencies exhibited by the kittens during the first month of life were the food response (nursing), random escape (?) behavior when in the observation cages, a positive tendency toward contact with other kittens and toward large white rats, orientation toward sudden or unusual visual or auditory stimuli, and manipulatory responses. The kittens were conditioned to drink milk from a pan at four weeks of age. After this the kittens became conditioned rapidly to eat cooked cereal, eggs, bread soaked in beef broth, and, in the case of three kittens, cooked meat. During the five months of controlled observations of the kittens, only one kitten killed and ate a white rat that was more than eight days old. In this case, when a white rat with a bloody ear, resulting from a recent clipping of the ear, was placed in the cage with the kitten, it was killed and eaten by the kitten after considerable manipulation. This kitten, however, never again killed or ate a white rat. Three kittens became conditioned to kill and eat wild gray mice; three kittens, after they were five months old, became conditioned to kill and eat baby white rats one week old; and three kittens became conditioned to kill and eat white mice. One kitten never killed or ate a rat or mouse during the entire experiment.

The theory is advanced that the moving of the rat results in an orientation on the part of the kitten, and that this orientation soon develops into manipulatory responses, and later into chasing responses. If, when the kitten seizes the rat or mouse with its mouth after chasing it, the rat or mouse struggles, the kitten bites harder and thus breaks the skin. This biting results in the taste of blood and flesh, and thus in the conditioning of the kitten to kill and eat rats or mice. Kittens thus become conditioned to kill and eat rats when the food response and the orienting response become connected through the wildness of the rat and its struggles to escape after being caught.

CURT ROSENOW. *Are There Subjective Facts?*

No one can doubt that people see after-images and feel pain. Because others cannot see *my* image or feel my pain, these experiences are called *subjective*. Again, no one should doubt that feeling pain is an activity. By the same criterion, if that activity can be observed by others it is *objective*. Now we do see or hear people suffering pain. We do not feel their pain any more than we digest their food or perform any other of their organic activities. We do perceive that they suffer,—sometimes with perfect immediacy and directness and, accordingly, without inference. Logically it makes no difference whether a single observation is correct as long as the fact observed is essentially possible and essentially verifiable.

Granting that the activity of experiencing is objective, it will be urged that the experience itself is not an activity and is a subjective object or fact. So far as we think clearly and consistently our reaction to this position will determine our position in metaphysics. If we accept it, we should follow Bradley and Bosanquet and accept objective idealism. If we reject it, we should accept some form of neo-realism. If we leave the question open, we arrive at some form of pragmatism which, as charged by its critics and admitted by its disciples, is not a metaphysical position at all. If we are willing to confess our metaphysical ignorance instead of exhibiting our ignorance of metaphysics, we are free to observe and discuss facts which, admittedly, are facts, and we need not bother with the distinction between *objective* and *subjective*.

The meaningful act means something other than itself. Observation is a meaningful activity. The act of observation may be directed toward another meaningful act, but not toward itself. Accordingly I can observe the seeing-of-after-images by myself or by others, but I cannot observe an after-image *in myself* or *in others*. Logically, the after-image is *within the act*. The act is the logical unit. It cannot be broken up into seeing and after-images. As for the metaphysical status of pain and after-images as such, it need not concern the psychologist any more than the metaphysical status of chairs, tables, and electrons.

Curt Rosenow. *The Differentia of Human Intelligence.*

Taking the essential continuity of human and infra-human organisms for granted, there are perhaps certain differences and it may be that some of these differences are not entirely unimportant for an understanding of *human* intelligence. Before coming to closer quarters with one of these differences I wish to state what I take for granted.

Intelligence is demonstrated by means of changing behavior which meets successfully changing environmental conditions. This in turn arises out of the fact that the organism perceives (or thinks about) the environment as a configuration in which various factors are perceived (or thought about) as tentative means toward desired ends. Mechanically, a complex organism with a complex nervous system appears to be a necessary condition of such integrated activity.

With exception of the parentheses, this statement fits animal intelligence as well as human. Expanding, the human and the infra-human organism evolves along social lines. He perceives, correctly or incorrectly, what the acts of others mean in terms of his responses. The attack of the other means flight or defense. At a later stage the *human* organism reacts in the same way toward his own activities, that is, he presents the attack of the other to himself and reacts to this presentation. A configuration is thought about *as involving his own activity.* As such behavior becomes unnecessary, it is discontinued. First the attack is perceived as an occasion for flight. Later a defense is planned, tried, and proven successful. After that the attack is perceived *immediately* as an occasion for defense.

If one is interested in impoverishing psychology, one may call this process nothing but a conditioned reflex. At any rate, it is the way in which behavior changes in characteristically human fashion. From the point of view of intelligence the important factors are (1) correct understanding of the meaning of one's own activity (this is the human element), and (2) adequate understanding of the motives of others with reference to one's own (this we share with the animals). The formula applies to abstract thought as well as to social life. Before one can dissent *intelligently* from the position of another, one should be able to present it to oneself. And progress in the realm of thought is achieved through recognition and abolition of previous inadequacies.

Men and animals perceive means toward ends. Both modify their activities. Man alone *considers* modifications of his own activity.

George H. Rounds. *The Changes in Oxygen-Consumption During Intensive Practice in Addition.*

Method. The subject expires through a face-mask into a Douglas bag; air analysis on Haldane-Henderson-Bailey apparatus; a trained subject; practice three times a week for three months; twenty-minute practice periods; addition problems consist of three ten-figure columns with the figure '0' excluded. During rest the subject sits relaxed in a chair for thirty minutes; then a ten-minute bag of air is collected. During work, two ten-minute bags of air are collected.

1. *During Rest.* The oxygen-consumption progressively declines from about 245 c.c. per min. to about 200 c.c. per min. In this resting-apparatus environment is constant (wearing the face mask, for example). The subject becomes adapted or adjusted to these constant environmental stimuli, and the constant stimuli cease to excite or annoy. Hence the oxygen-consumption declines to a relatively fixed resting level. It is predicted that the same sort of adaptation will take place when the external noise is constant.

2. *During Work.* The total oxygen-consumption is relatively uniform during the entire three months. The subject puts forth about the same effort on each and every day of practice. The work done, on the other hand, changes in a marked degree. At the beginning of the practice the subject did 19 problems; at the end of the third month, he did 41 problems. He doubles his output with no change in his cost of production in terms of

oxygen-consumption. During work some stimuli are or become constant; for example, the subject seeks combinations which make ' 10 ' such as ' 5 + 5 '; he becomes adapted to this combination and habitually uses it with some skill. But he also seeks other combinations to make ' 10.' The different adjustments or adaptations which take place as the subject progressively increases his speed in addition are very numerous. Adaptation is constantly taking place but is practically never completed. The subject is always adapted to some stimuli, in progress of being adapted to other stimuli, completely unadapted to still other stimuli. Complete adaptation will take place only when the subject reaches his absolute maximum speed, and for the present subject this is a long way off.

It is suggested that the stimulus-adjustment situation which is exhibited during intensive practice in addition is similar to the stimulus-adjustment situation in many problems of external noise. Some parts of New York City, for example, exhibit (1) noises which are relatively constant, so that one becomes adapted to them, whereas there may also be (2) noises which are not constant in one or more aspects. New noises are constantly appearing, either single noises or new combinations of noises.

H. deB. B. Roxo. *Medical Psychology in Rio.* [Editor's abstract.]

The author describes the general methods in use in the diagnosis of new cases at the Psychiatric Clinic of the University of Rio, Brazil. He shows the relation of the psychiatric work to experimental psychology, and discusses particularly cases of schizophrenia, delirium, manic-depressive psychosis, paranoia, arterio-sclerosis, paresis, senile dementia, hysteria, imbecility, and idiocy.

The paper also presents certain chronoscopic measurements of the times of psychic processes. These data show abnormally long times for cases of senile dementia, mental confusion, imbecility, and alcoholic psychosis, but relatively short times for hysterical cases.

EDGAR RUBIN. *Psychology Regarded as a Positive Science.*

Two tendencies (among others) characterize scientific work. The first of these is a monistic tendency; its end is simplicity and a coherent whole. It is connected with some religious and artistic tendencies (*the* meaning of the world, unity in plurality). The other, the critical, sober tendency, has as its end the acceptance of only such propositions as have been thoroughly proved in every detail. Results of scientific value arise, when the critical tendency dominates over the monistic.

The progress of psychology is hampered if a psychologist gives himself up to the monistic tendency without properly regarding the demands of the critical tendency. Professors ought to be modest and should not regard their interest in more or less fundamental psychological theories as indicating ability to create such theories.

If psychologists wish to avoid using time and energy in the building of card-castles and the still more useless discussions about them, then they must realize that scientific psychology is a very young science. To say this is almost the same thing as to say that in psychology we have scientific knowledge of only a limited number of fragments. It follows from this that we cannot with scientific honesty on the basis of our present knowledge give general statements which concern a whole, especially the whole domain of psychology. It is due to an inheritance from that sort of philosophy which has as its end the giving of a well-rounded picture of the world, that psychologists sometimes are seduced from what is scientifically well proved. Psychologists ought not to use theories as a veil for their ignorance.

People often claim that working hypotheses or *Hilfshypothesen* are necessary for the progress of science. This assertion is an hypothesis itself and an hypothesis not proved by the evolution of science. Often its real purpose is to let the monistic tendency have its way without due criticism. It is a common experience that really productive scientific work can be done without any use of all-embracing hypotheses.

Hypotheses and vague general statements, *e.g.* about the nature of consciousness, which cannot be proved or disproved immediately, ought to be kept quite private. We know at present so little in psychology that it is extremely difficult to deduce the unknown from the known. Therefore, it is a general experience that very many theories are disproved the moment we try to verify them. People ought not to publish their theories until they have earnestly tried to prove them, for they would then have seen good reasons for keeping them to themselves.

When a supposition, even if it has very little foundation in proved fact, reaches a certain age it takes the form of a sort of venerable dogma. From daily life, philosophy, the older psychology, and from physiology, present psychology has taken over a number of such dogmas. Classifications with their correlative names very often contain such dogmas. It is very important for that sort of psychology, which wants really to prove whatever it says, to criticize thoroughly all such traditional notions and thus in course of time to get rid of them and their unhappy effects. But this is a very difficult task because the power of custom is great; the case is here as it can be with the religion of childhood.

Psychological schools are a nuisance. As a rule the association of the members with each other serves as a help towards the continued belief in some unproved favorite notions which characterize the school. As a rule the founders of a school are not so bad as the pupils.

Of course it is permissible to announce that one is specially interested in some part of psychology, *e.g.* the import of the totality for what belongs to it, or in the behavior of rats and persons. But it would not be right, through the medium of definitions of psychology or general assertions, to prohibit others from trying to work with things which do not interest oneself. In scientific psychology we have no use for popes.

EDGAR RUBIN. *Concerning the Soul and the Dualistic Nature of the Individual.*

The older positivistic psychology had, without acknowledging it, a difficulty concerning the ' bearer ' of the mental states. This difficulty was exposed by the supernaturalists, partly as a proof of their doctrine about the soul. Regarding the soul as an unnecessary complication with a dangerous abstract nature, we can take their criticism to heart. Our solution of the problem is that the concrete individual himself, Mr. F. B. Brown, as he walks and thinks and eats, is the bearer of his mental states. Like every other concrete thing, the individual cannot be defined. It can be identified, however, so that it can be made the object of progressive study and research.

The dualistic nature of the individual has been postulated metaphysically by Descartes and methodologically by Spinoza. Physics has evolved in accordance with the rule of Spinoza and does not know anything about psychic life. Psychology has never kept to the rule of Spinoza, but has always regarded the psychic world in connection with the physical world.

We know so little about the relation between mind and the nervous system that we have no possibility whatever of predicting how this problem will be solved in the future.

It may be that physics, incorporating the psychic, will give up the rule of Spinoza as no longer fruitful, and at the same time be profoundly altered with regard to basic concepts.

F. L. Ruch. *A Comparison of the Effects of Hunger and of Escape from Water as Motivating Conditions.*

Christian A. Ruckmick. *Musical Appreciation: a Study of the Higher Emotions.*

The aesthetic judgment in music may be based upon three typical categories: (a) analytic, (b) perceptual, and (c) affective. The analytic category implies a cognitive attitude in terms of which a composition or performance is to be judged. Such examples would be the noting of melodic or thematic development, harmonic progression, structural form, and mass effect. These are some of the expressions used by musical critics in analyzing new productions on the concert stage or on the basis of the score.

The perceptual categories are immediately recognized aspects or factors, such as various inversions of the major triads, changes into related key, peculiar dissonant effects, typical *motifs*, so well known as to be fairly familiar.

In affective reactions the immediate mental attitude is based upon one or more factors which are not explicitly experienced. The feeling is that one likes or dislikes certain passages without knowing the reason why. Certain effects have been produced to which there is a general somatic reaction without full realization in conscious terms. Often after the feeling sweeps over the individual he can bring out factors which influenced his judgment on an affective basis. More often the artistic temperament bases its judgment more on the general feeling produced than on any specific criteria. The primary elements which form the basis of the artist's judgment are too deeply buried in past experience to stand out in full at the time that judgment was made.

CHRISTIAN A. RUCKMICK. *A Demonstrational Model for Tones and an Improved Sanford Chronoscope.*

The author believes that students of elementary psychology are greatly aided in their comprehension of fundamental facts through the use of diagrams and models. While the fundamental qualities in many of the sense-departments are not yet sufficiently established to warrant qualification, we may, nevertheless, use tentative schemes in order to clear up the situation. To this end the author has scanned the auditory field and has proposed the scheme called, for want of a better name, tonal bell.[1]

In this diagram the pitch qualities are assembled on a spiral vertically intersected by twelve lines indicating tonality relations in each octave. At the lower and upper ends the frequencies below and above the ordinary limits of hearing are included for reference. For the time being until the quality of diffusion or 'volume' is further stabilized or refuted, it is represented as the diameter of the bell at each upward rise of the spiral. This gives the tonal bell its flare in the bottom and brings the spiral approximately to a close at the top. The speed at which the spiral rises indicates approximately the number of auditory qualities discriminable in each octave.

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[1] Cf. A new classification of tonal qualities, *Psychol. Rev.*, 36, 1929, 172–180.

Another piece of apparatus which we have perfected in the laboratory is a modified form of the Sanford chronoscope. It makes the releases electro-magnetic and provides pegs on which the bobs may be hung when not in use to prevent stretching of the threads from which they are suspended. The electro-magnetic release makes it possible to remove the observer some distance from the chronoscope.[2]

CHRISTIAN A. RUCKMICK. *Meaning as Phenomenological Experience.*

Meaning in its essence is unscientific. It is valid chiefly as a term used in daily life in an undifferentiated way to designate experiences as they come to us in uncritical attitudes. These attitudes may involve knowing, as well as appreciating and using, circumstances and things about us. The next requirement is that meanings remain unrestrained by scientific classification. When the latter process occurs, an unreal change has been effected in the interests of any particular science. Sensations and instincts not only do not exist, but percepts, emotions, and thought processes are worldly unrealities.

When we then encounter meaning in psychology it is only to describe its mental (and sometimes physiological) counterpart. The sign of equality in the psychological formula must be taken to be one of equivalence, not one of identity. There is a further constructive usage found in the explanatory or theoretical phases of the science when we raise the question of the significance of our data. Meaning here has a much more restricted usage, but indicates that we are interested in making the synthesis in part or in whole toward the meaningful world from which the analysis was first made.

HANS RUPP. *Ueber Häufigkeitskurven.*

Bestimmte Arten von Häufigkeitskurven haben streng gesetzmässig bestimmte Formen.

1. *Zeitkurven* sind links-asymmetrisch, das heist, der Gipfel

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[2] Cf. Some suggestions in laboratory apparatus, *Amer. J. Psychol.*, 38, 1927, 647.

liegt mehr oder weniger links. Nur in bestimmten Grenzfällen werden sie symmetrisch, nie dagegen rechts-asymmetrisch, wenn nicht fremde Einflüsse wirken. Das gilt sowohl von intra- wie von inter-individuellen Kurven. Sehr einfache und sehr geübte Arbeiten liefern fast symmetrische Kurven von geringer Streuung, schwierigere Arbeiten meist asymmetrische Kurven von grösserer Streuung; sehr kritische Arbeiten, ebenso Arbeiten bei der ersten Ausführung, wo man noch überlegen und probieren muss, liefern breite Kurven, die sich wieder der Symmetrie nähern können. Drängen auf Schnelligkeit verengt die Kurve und macht sie meiste schlanker, drängen auf Genauigkeit macht sie breiter und weiter. Bei Uebung wird die Streuung geringer. Bei einfachen Arbeiten brauchen die Schlechtesten etwa 1½ bis 3 mal soviel Zeit als die Besten, bei schwierigen bis 10 mal soviel und mehr. Bei Zusammenfassung mehrerer Werte wird die Kurve enger und symmetrischer. Besondere Antriebe können auf bestimmte Werte hindrängen (z. B. Forderung einer Mindestleistung) und so die normale Kurve entstellen. In allen genannten Fällen wird nur die Zeit, nicht die Güte berücksichtigt. Rechnet man die Zeiten so um, wie sie bei gleicher Güte zu erwarten wären, so wird die Zeitkurve stärker asymmetrisch, wenn Zeit und Güte parallel gehen, und weniger asymmetrisch, wenn sie entgegenwirken.

2. Ganz Aehnliches gilt von *Genauigkeitskurven* (z. B. Fehler bei Augenmass, bei Treffversuchen usw.). Alle Fehler werden absolut gerechnet; die Kurve ist nicht mit dem Streuungsbild nach verschiedenen Seiten hin zu verwechseln. Die Links-Asymmetrie ist sehr verschieden. Bei leichteren Aufgaben geht die Kurve ganz an den Nullpunkt heran (die Zeitkurve dagegen nie), oder der linke Ast setzt nicht auf der Abszisse, sondern höher ein.

3. *Kraftkurven* scheinen links-asymmetrisch zu sein oder sich der Symmetrie zu nähern. Doch ist zu beachten, dass jetzt die Schwachen links und die Guten rechts liegen. Bei schwierigen Aufgaben setzt die Kurve wieder im Nullpunkt oder über dem Nullpunkt ein. Nach Uebung werden die Kurven vielfach symmetrisch, so viele Sportkurven. Dass ist verwunderlich, weil die

Masse, nach denen die Leistung bestimmt wird, sehr verschiedenartig und willkürlich sind, z. B. keineswegs der aufgewendeten Energie proportional sind. Antriebe können wieder die Kurve entstellen, z. B. runde Leistungszahlen begünstigen.

4. *Ausdauerkurven* zeigen ähnliche Gesetze wie die Kraftkurven.

5. *Mengenkurven* für die in gegebener Zeit gelieferten Arbeitsmengen. Es wird eine unbegrenzte Zahl einzelner, sich gleich bleibender Aufgaben oder zu arbeitender Stücke vorausgesetzt, und es wird festgestellt, wieviele davon gelöst werden. Zeit und Menge stehen in bestimmter arithmetischer Beziehung, die Kurven lassen sich voneinander ableiten. Die Form der Mengenkurve ist aber nicht so eindeutig bestimmt, wie die Form der Zeitkurve. Noch undurchsichtiger werden die Verhältnisse, wenn man nicht die Menge aller Lösungen, sondern nur die der richtigen, oder die richtigen abzüglich der falschen usw. verwendet.

6. *Lösungszahlkurven* nach der Zahl der Lösungen bei gegebener Zahl von Aufgaben. Während bei den Zeit- und Mengenkurven meist vorausgesetzt wird, dass die Aufgaben gelöst werden können, sind hier solche Aufgaben gewählt, die die Schwachen schwer lösen können; man bestimmt daher die Menge der richtigen Lösungen. Die Kurven sind prinzipiell nach beiden Seiten begrenzt (Zahl der Aufgaben). Die Form der Kurve ist je nach Schwierigkeit links- oder rechts-asymmetrisch, ändert sich aber auch, je nach dem die einzelnen Aufgaben gleich oder verschieden schwierig sind, und je nach dem man nur die richtigen Fälle berücksichtigt oder auch die falschen Fälle davon abzieht u. dgl. Wieder haben Antriebe bedeutenden Einfluss auf die Kurve, z. B. starker Antrieb zu Anfang, gegen das Ende von Abschnitten zu, zögerndes Herangehen an neue Abschnitte, Flauten, wenn man fast fertig ist, usw.

Die verschiedenen Einflüsse auf die Kurve lassen die tieferen Gründe der Kurvenformen vermuten. Freilich sind vielfach nochgenauere Untersuchungen erwünscht.

Die Häufigkeitskurven haben praktische Bedeutung für die Bewertung der Leistungen; ferner dürfte sich durch sie die wichtige Frage der Antriebe während der Arbeit wesentlich fördern lassen.

Hans Rupp. *Die objective Leistung und die innere Bedeutung der Tests.*

Hans Rupp. *Ueber Intelligenz.*

Intelligenz ist die Fähigkeit, Gebilde zu strukturieren. Das Strukturieren eines Gebildes kann höchste oder primitivste Leistung sein. Die weitaus wichtigste Aufgabe der Intelligenzforschung ist es, gerade diese Unterschiede und damit die Stufen der Intelligenz zu erklären.

Dies gelingt vielleicht am ehesten bei räumlichen Aufgaben. Wer z. B. ein Muster abzeichnen oder fortsetzen will, muss den Bau des Musters verstehen, muss es durchstrukturieren. Da das Zeichnen nur Stück für Stück möglich ist, so muss er auch "analysieren," d. h. das zu zeichnende Stück nicht nur herausfassen, sondern auch seine Stellung im Zusammenhang erkennen. Der Schwache hat nicht diese leichte Beweglichkeit im Strukturieren. Das Ganze verschwimmt ihm leicht. Oder wenn er einen Teil klar herausfasst, geht ihm der Zusammenhang mit den Uebrigen verloren.

Man kann eine aufsteigende Reihe von Mustern aufstellen, die immer schwieriger werden, und kann die Gründe dafür einigermassen angeben. Die schwierigeren sind reicher, verschlungener, die Teile gehen in Gestalten unter, gleiche Teile verschmelzen, Inversionsfiguren, optische Täuschungen stellen sich der Auffassung entgegen usw. Dasselbe Gebilde kann jedoch je nach der vielleicht zufällig gewählten Strukturierung, je nach der Reihenfolge des Zeichnens, ferner bei verschiedener Grösse und in verschiedenen Teilen sehr verschieden schwierig sein.

Beim Ordnen, Zusammensetzen, beim Suchen von Einpassstücken (nach Friedrich) und vielen anderen Aufgaben ist der Schwache dadurch gekennzeichnet, dass er Stück für Stück probiert, ohne an den weiteren Zusammenhang denken zu können. Ebenso verliert er während der Arbeit leicht den Zusammenhang mit dem Früheren oder mit einem bereits gefassten Plan, wiederholt daher dieselben Fehler usw. Das Stukturieren so grosser Gebilde ist ihm eben unmöglich; er geht im Einzelnen unter. Dabei bestehen wieder grosse Verschiedenheiten in der Schwierigkeit.

Dieselbe Fähigkeit des Strukturierens, wie sie für das räumliche Gebiet leicht aufzuzeigen ist, besteht nun auf allen Gebieten. Auf dem akustischen Gebiete dürfte das leichte Strukturieren ein wesentliches Merkmal des Musikalischen sein. Auf dem motorischen Gebiet ein wesentliches Merkmal des Geschickten.

Aber auch auf optischem Gebiet geht das Strukturieren über das räumliche tausendfach hinaus. So in den mechanischen Auffassungen (Schwere, Hebelwirkung, Elastizität, Widerstand usw.), oder in der Auffassung von Gesichtszügen, Auffassung von Situationen (z. B. Binetbilder usw.).

Das eigentliche Gebiet der Intelligenz ist endlich das der Sprache. Hier wird die sachliche Struktur doch durch die Struktur der sprachlichen Bezeichnung kompliziert. Für die verschiedenen Stufen kehren aber ähnliche Gesichtpunkte wieder.

So ist die Strukturierbarkeit eine gemeinsame Eigenheit aller Gebiete oder Felder geistiger Prozesse. Sie scheint in der Regel auf den einzelnen Feldern ungefähr in gleichem Grade vorhanden zu sein, worauf die starken Korrelationen hinweisen. Andererseits müssen die Felder als prinzipiell unabhängig betrachtet werden, denn es gibt Fälle von speziellen Begabungen oder Unbegabungen auf einzelnen Feldern. Welche Felder zu trennen sind, lässt sich dabei heute noch nicht überall entscheiden.

Wichtig ist die Frage der Uebbarkeit. Das einzelne Gebilde lässt sich üben, so dass es, wenn es nicht zu schwierig ist, auch vom Schwachen strukturiert werden kann. Die ganze Entwicklung des Menschen besteht zu einem wesentlichen Teil im Lernen von Strukturierungen. Dennoch kann man sagen, dass der Mensch nicht relativ intelligenter wird; denn bei gleicher Uebung bleibt der Begabte immer besser. Intelligenz ist also stets relativ zur Uebung und zur Entwicklungsphase zu fassen, und die Intelligenzproben müssen daher dem Entwicklungsniveau und der Vorbildung angepasst werden.

HERBERT C. SANBORN. *The Problem of Music.*

In the field of modern aesthetics several views concerning the meaning of music have long been in conflict, all of them with both popular and scientific defenders. Apart from the physiological sensualistic view usually held by Helmholz and Wundt, two main theories have occupied the field. Probably the best known of these is the one which stands, perhaps, in principle closest to the naïve attitude of the average layman (although its detailed application is far from being naïve) and which finds its most prominent exponent in Wagner; while in sharpest contrast with this stands the theory which has its most consistent representative in Zimmermann with its best known protagonist in Hanslick.

From the latter point of view, which defined itself historically in opposition to the vogue of Wagnerian art, music is not expressive, but consists merely of formal patterns. The emotion of the auditor and of the reproducing artist is, however, taken to be real though aesthetically irrelevant. The attempt is made here to consider the work of art in scientific abstraction as something independently real, whereas only in relation to subjects do works of art as such come into existence. The problem here also involves the nature of aesthetic emotion and the validity of aesthetic judgment. The aesthetic attitude in music, as elsewhere in art, is concerned, not with real emotion, but rather with emotion objectified or felt into the medium of *communication,* while the subjectivity involved need not be taken to imply that art, and in particular music, is not the bearer of a universal content.

R. N. R. SARMA. *New Light on Dream Psychology.*

(1) The Prasna-Upanishad (so-called after the six questions addressed to a *Guru*-teacher or spiritual preceptor by six disciples, seekers after truth) propounds what is technically known as the *Mahima*-theory of dreams. Literally *Mahima* means greatness or majesty. That is enjoyed by the subject in dreams. Waking life with its almost countless inhibitory influences and arrest-agencies does not afford the necessary opportunity for the enjoyment of *Mahima.* Waking life hardly does justice to the sacredness and claims of individuality. Plenty of tall talk there is,

but even in the most democratic countries, the so-called freedom of a free individual is cribbed, cabined and confined. Exploitation is the order of the day. The Kantian dictum is clean forgotten and individuals are treated only as means. Dreams afford the opportunities for the unrestricted enjoyment of the majesty of the self; the seen and the unseen, the new and old, the rational and the irrational, *all* (*sarvam-pasyati*) form the content of dream-life.

(2) The Brihadaranyaka-upanishad develops in an interesting and attractive manner transition from waking life to sleep, to dreams, and back to waking state. *Svapnanta, Buddhanta,* and *Svapna* are the keywords. The Brihadaranyaka maintains the persistence of ethical considerations and values in dreams. The dictum of Hildebrandt cited by Freud that the purer the waking life the purer the dreams, and the impurer the former the impurer the latter, does not find favor with the Upanishadic seers. The order of fatigue, sleep, and dreams is sketched.

(3) The Chhandogya repeats with emphasis the theory of Mahima. (*Svapne-mahiyamanascharati.*) More than half a dozen other texts from the Sarvasara, Paingala and other Upanishads have been critically examined.

The conclusion is this. Freud's hypothesis of wish-fulfilment is too narrow. The conflict-solution hypothesis of Rivers is untrue to facts, as several conflicts are not solved in dreams, and as other dreams contain no evidence whatever of the continuation of the conflicts of waking life into dreams. The theories formulated by MacCurdy and Hollingworth are examined. The Upanishadic trend of thought can thus be summarized. For reasons best known to herself, Nature is guilty of partiality in endowing her children with abilities and opportunities. For this partiality she has a compensation ready in dreams. The biter of the waking life is bit in dreams. The aggressor is aggressed. According to another text, dreams are inevitable. Waking life, dreams, sleep, are to be transcended and a fourth state of bliss is to be entered into by spiritual aspirants. Waking life is the crux. Its little problems will have to be solved then and there, and the situation rounded off. " Don't worry, do your best " are the Upanishadic precepts. Let not the world be too much with you. Cultivate the spirit of *Vairagya,* of non-attachment, and dreams pleasant and unpleasant are then unnecessary.

F. M. SAUER, see H. CARR.

F. C. S. SCHILLER. *Meaning.*

Why should not psychology undertake to describe *meaning* and the meaning-experience as it occurs in nature? It would be a great help to logic and would decide several vexed questions in psychology itself. Thus behaviorism would be reduced to the status of a methodological fiction. It is vain to object that the categories of science forbid us to consider Meaning. Were this true, the answer would simply be that these obstructive categories can and must be changed.

HAROLD SCHLOSBERG and LEONARD CARMICHAEL. *Apparatus from the Brown Psychological Laboratory.*

Simple heat grill. A simple heat grill, satisfactory for use in experimental courses, may be made in a few minutes. It consists essentially of two blocks of wood or other material, into each of which are inserted six rods, like the teeth of a comb. They are so spaced that the teeth of one may be intermeshed with those of the other block, forming a flat row of twelve rods. The two elements may be brought to the proper temperature by immersing them in warm and cold water, respectively. If they are then intermeshed, and placed in contact with the skin of the subject, an experience of heat results. A very satisfactory grill was made by screwing brass rods into copper blocks, but a simpler one, consisting of nails driven through blocks of wood, was found to be quite effective.

Simple conditioned flexion-reflex apparatus. To record the conditioned flexion-reflex of the forefinger, the following arrangement may be used. An inductorium is arranged in series with a buzzer and two telegraph keys, one for *E*, the other for the subject. The buzzer interrupts the current flowing through the primary coil, and also serves as the conditioned stimulus. A signal-marker is shunted across the coil and buzzer. The subject's key, from which the insulating knob has been removed, also serves for one terminal of the secondary, and a large indifferent electrode on his right forearm serves as the other. The subject is instructed to hold down his key with his right forefinger. Then, when the experimenter presses his, both buzz and shock are presented simultaneously to the subject, and the marker is displaced. The shock causes the subject to remove his finger from the key, thus opening all circuits, stopping the buzzer, and releasing the marker. When the conditioned reflex alone is desired, the secondary is shorted.

Records are made on a smoked drum, turned by hand. A time line is furnished by a second marker, actuated by 110 volts, 60 cycle A.C., with a 60-watt lamp as resistance. This silent arrangement permits readings of the latent times of conditioned, unconditioned, and 'voluntary' responses to 0.01 sec.

New stylus maze. A new form of stylus maze having certain advantages has been developed. A model is first made by fastening wooden strips on a board, to form the desired alleys. These strips have a right isosceles triangle for their cross-section, and are made by ripping down the diagonal of a half-inch square strip. The strips are so cut at the ends that they fit together, forming a continuous raised triangular mould. After this mould has been sandpapered and coated with paraffine, the maze may be cast in cement. A watery mixture of pure cement reinforced with quarter-inch galvanized mesh seems best for this purpose. It is then painted with deck paint. A ball-pointed stylus is used, which rests on both of the sloping sides of the alley at one time, discouraging the subject from 'hugging' one side. Another advantage of this maze is the ease with which many duplicates may be made.

Max Schoen. *The Nature of the Musical Mind.*

While much experimental work has been done on the nature and the measurement of musical talent, we find but a few scattered and somewhat fragmentary investigations regarding the mentality of the music lover. The first step in this direction is to ascertain the nature of the musical experience. On this we have considerable data. Using this as a basis, the writer believes that we could construct a series of tests that would yield us the constituent elements of the musical temperament. A report of several investigations conducted by the writer in the attempt to devise such tests is given.

Max Schoen. *The Criterion for the Aesthetic Experience.*

The author contends that the criterion for the aesthetic experience is to be found neither in aesthetic theories presented by psychology and philosophy nor in the results of experimental aesthetics, but is to be sought in what creative minds have said directly or indirectly about their work, their motives, and their objectives.

The aesthetic experience occurs in different persons in different degrees of purity and intensity, hence its real nature can not be determined by asking those who experience it casually and vicariously, or those who speculate and theorize about it, but by consulting those who really know, those who live by it and through it, to whom it is life, as to a Keats in poetry or a Beethoven in music.

The points in the argument are: (1) that just because an experience is derived from an art object it is not for that reason alone, unconditionally an aesthetic experience; (2) that the varieties of experiences derived from an art work can not possibly all be aesthetic experiences any more than a variety of opinions expressed on some matter of fact are all true just because they are opinions about a fact; (3) that all experiences derived from an art work are valid *as experiences,* but do not necessarily have *equal value* as *aesthetic experiences.* As aesthetic experiences they may range from complete distortion to highest purity. (4) Therefore, there is need for a criterion of evaluation, and this criterion must be the experience in its purest form, and as such it is found only among those whom it drives to the creation of art works, to give the experience bodily form. (5) The various aesthetic theories do not deal with the aesthetic experience, as such, but with the conditions brought about by the experience, that is to say, such criteria as intrinsicality, disinterestedness, distance, purgation, repose, empathy, are not descriptions of the *aesthetic experience* but of the *conditions* created by the experience.

C. E. SEASHORE. *The Rôle of Experimental Psychology in the Science of Art and Music.*

A thorough scientific psychology of music requires the study and solution of the following problems.

Analysis and classification on a two-fold basis: the physical attributes of the sound wave, and the traits of the musical mind essential for response to these; a theoretical analysis verified and extended through experiment.

The measurement of specific capacities and aptitudes: a profile of musical talents representing a large variety of specific measurements on cognitive, affective, and motor capacities and responses in relation to each of the attributes of musical sounds.

The measurement of the character, extent, and progress of achievement under the influence of maturation and training in terms of specific skills in the various phases of musical appreciation and performance.

Vocational, avocational, and educational guidance on the basis of talent profiles, involving validation of available measures of talent in relation to musical achievement, the selection of pupils for musical instruction, and the diagnosis of impediments encountered.

Genetic studies on the inheritance of musical talent, the development of the musical mind in early childhood, anthropological studies of racial types, and the evolution of music in primitive pupils.

The foundation of musical esthetics based upon the experimental studies in each and every medium for the expression of beauty in music as determined by intensive laboratory experiments.

Musical training: organization of the pedagogy of music on psychological foundations, and the introduction and standardization of instrumental aids for the facilitation of training in specific aspects of musical performance, such as artistic control of pitch, rhythm, and timbre.

The outcome of all these should result in the structural material for a scientific psychology of music, based entirely upon experimental findings.

ROBERT HOLMES SEASHORE. *Individual Differences in Rhythmic Motor Coördinations.*

Kinesthesis has been so widely recognized as a fundamental of rhythmic impressions that it offers an excellent field for objective analysis. Earlier work at the University of Iowa has developed a number of techniques for the measurement of temporal precision in following a simple rhythmic pattern and this motor precision was shown to be correlated with accuracy in sensory discrimination of rhythm patterns. Both Seashore and Nielsen found that scores on the Iowa motor rhythm test are higher for trained instrumental musicians than for an unselected university group, but that some students make excellent scores in spite of the fact that they have had no formal musical training. Furthermore specific practice on the motor rhythm test has shown only very moderate gains in precision on the same test.

The above findings have led to a tentative description of a 'basic motor capacity' in the field of rhythm. The accuracy and usefulness of this descriptive term may now be further tested by finding out whether precision in one pattern is closely related to precision in handling other patterns, and whether there is a 'personal equation' which holds generally for right and left hands and feet, or other musculatures. A research grant at the University of Oregon will carry on this study during the coming year and several other studies will approach the problem from different angles. Through the development of an automatic counter for scoring rhythmic precision it is now possible to include a motor rhythm test in a sampling of motor skills tests which are to be given to factory apprentices, typing students and dancing classes. These studies should afford estimates of the importance of motor rhythmic coördinations as a fundamental variable in determining achievement in practical motor skills.

ROBERT HOLMES SEASHORE. *Progress in Research on Motor Skills.*

Previous reports[1] have outlined (1) major problems and techniques in motor skills, and (2) an analysis of motor skills by a series of laboratory investigations evaluating the five principal theories which have been advanced to account for the observed individual differences in motor skills. This report summarizes a new series of projects now being carried on in the laboratory on the interrelations and persistence of individual differences in speed and accuracy of single and serial performances. Techniques and controls used in the work are illustrated in a project for the validation of a portable motor-skills unit in the prediction of a practical skill, that of typing. Additional experimental checks are suggested for the evaluation of the theories of general and specific abilities in motor fields.

OTTO SEELING. *Psychologie und Heilpädagogik.*

Der Begriff der Heilpädagogik ist in Deutschland noch immer umstritten. Der Wiener Anstaltsdirektor, Dr. Theodor Heller, hat in seinem "Grundriss der Heilpadägogik" versucht, ihn zu definieren. Nach ihm beschränken sich die Aufgaben der Heilpädagogik nicht ausschliesslich auf die Erziehung und den Unterricht schwachsinniger Kinder: das Arbeitsgebiet erstreckt sich auf alle jene im Kindesalter vorkommenden geistigen Abnormitäten, bei denen durch Herstellung günstiger Entwicklungsbedingungen eine Regelung der gestörten seelischen Funktionen erwartet

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[1] (1) *Psychol. Bull.*, 25, 1928, 454; (2) *ibid.*, 26, 1929, 4.

werden kann. Heller tritt somit für eine pädagogische Therapie ein. Infolge des Widerspruchs aus der Aerztewelt sind die deutschen Heilpädagogen zu der Ansicht gelangt, dass der Ausdruck Heilpädagogik die Sache nicht richtig bezeichnet; denn der Pädagoge habe auch bei der Erziehung anormaler Kinder keinen Heilungsprozess einzuleiten oder zu überwachen. Die primäre Zuständigkeit des arztes in der Heilpädagogik, sofern an eine Therapie gedacht wird, ist heute unbestritten. Zur Klärung des Problems hat nicht unwesentlich der Vortrag Sprangers beigetragen, den dieser gelegentlich der " Heilpädagogischen Woche " in Berlin (15.–22. Mai, 1927) gehalten hat.

Bezüglich der Beziehung zwischen Psychologie und Heilpädagogik ist man insoweit zu einer einheitlichen Auffassung gelangt, als man in Fachreisen zugibt, dass die heilpädagogische Praxis in jedem Falle von der Eigenart der Psyche des Sonderschulkindes auszugehen und danach das Erziehungsziel zu modifizieren hat, dass also nicht wie bei der Erziehung Normaler ein für allemal gültige Erziehungsziele von der Ethik und von der Soziologie festumrissen entnommen werden können.

In welchem Umfange bei der Ausbildung der Heilpädagogen, d. h. der Sonderschullehrer, die Psychologie herangezogen wird, zeigt das Programmheft des " Heilpädagogischen Seminars Berlin-Brandenburg " (Oktober 1928 bis September 1929). Für alle Teilnehmer sind zunächst gewisse Universitätsvorlesungen verbindlich. Im Wintersemester 1928–29 hörten die Teilnehmer insbesondere folgendes: (1) Experimentell-psychologische Uebungen (Wertheimer); (2) Kinderpsychologische Uebungen (Lewin); (3) Ueber körperlich-seelische Zusammenhange, mit Demonstrationen (Jaensch).

Verbindlich nur für Hilfsschullehrer waren: (1) Klinische Fälle und anatomische Befunde (Creutzfeld); (2) Psychische und nervöse Störungen im Kindesalter (Stier); (3) Experimentelle Phonetik (von Eicken und Wethlo). Die zuletzt genannte Vorlesung war auch verbindlich für alle anderen Lehrerkategorien, die Anstaltslehrer ausgenommen.

Die heilpädagogischen Fachvorlesungen liegen im Rahmen der

Diesterweg-Hochschule. Sie sind fur alle Teilnehmer verbindlich. Dort werden gelesen: (1) Biologische Psychologie (Hylla: 18 Stunden); (2) Kinderpsychologie (Müller: 10 Stunden); (3) Differentielle Psychologie (Rebhuhn: 6 Stunden); (4) Medizinische Psychologie (Schaefer: 20 Stunden); (5) Tiefenpsychologie (Seeling: 6 Stunden); (6) Psychologische Voraus setzungen für die Erziehung Abnormer (Jahn: 10 Stunden); (7) Beiträge zur Psychopathologie Jugendlicher aus der schönen Literatur des 20. Jahrhunderts (Pagel: 6 Stunden).

Die Seminarteilnehmer haben innerhalb des vorgeschriebenen Studienjahres, in welchem sie vom Schuldienste völlig befreit sein müssen, 486 Stunden verbindliche Vorlesungen und Uebungen. Neu ist die Aufnahme tiefenpsychologischer Vorlesungen, verursacht durch die Erörterung des Problems der erhöhten Suggestibilität Debiler und Imbeziler und ihrer Ausnutzung fur erziehliche und Unterrichtszwecke in weiten Kreisen der Sonderschullehrerschaft. Auch die zunehmende Ausbreitung der Adlerschen Individualpsychologie und die nicht endenwollenden Diskussionen betreffend Wert oder Unwert der Freud'schen Psychoanalyse machte die Erweiterung der psychologischen Vorlesungen in der angedeuteten Richtung notwendig. Der bisher überwiegende Einfluss der Mediziner auf die psychologische Ausbildung der Sonderschullehrer scheint abzunehmen. Psychologen und Praktiker rücken in den Vordergrund.

LEONHARD SEIF. *Anxiety and the Strange.*

The qualities of *the strange* and *the known* play an important rôle in all relationships of the individual to human and non-human environment. The strange is the unknown, the new, the uncertain, the dangerous. Its emotional correlative is a feeling of uncertainty, anxiety in all its varied forms. The known is the accustomed, the certain. Its correlative is confidence, a sense of safety. Anxiety and confidence are opposites; where the one is, the other is not. Anxiety is at bottom always fear of death, the destruction of the individuality. In general, then, expectation and satisfaction correspond to the known, fear and disappointment to the strange.

Adler's individual psychology shows the child reacting to the strange with a feeling of uncertainty and insufficiency, which it endeavors to compensate in the direction of safety and power over things and people either through escape or direct dealing.

If he receives from his educator the right preparation,—love, confidence and encouragement, and suitable training for overcoming the difficulties of the strange,—he then learns ("Learning begins with disappointment": Koffka, O. Liebeck) always better to transform the strange into the known. The radius of experience becomes correspondingly larger, so too the certainty of orientation, activity, courage, and self-reliance; the feeling of insecurity is smaller. The child's questioning "Why?" at about the fourth year of age serves to overcome the feeling of uncertainty and anxiety with reference to the strange.

Organic inferiority and difficulties of milieu can intensify the problem of the strange.

The spoiled child has not learned to deal courageously with the strange; he is inclined to disappointment, anxiety, and withdrawal.

The child brought up without love, experiences life as baffling and hostile.

The child with organic inferiorities is liable to lack self-confidence and to remain aloof.

Whether the child becomes courageous or discouraged, confident or anxious, optimist or pessimist, depends upon his preparation and his consequent philosophy of life. A pessimistic response to the strange constitutes the basis of all deviations in the direction of neurosis, narcotomania, perversions, delinquency, psychosis, suicide. (Psychoses on an organic basis are exceptions.) Such deviation involves enormous increase of anxiety, diminution of satisfactory development, especially of spontaneity and ingenuousness.

Cure of such an attitude consists in correction of the misinterpretations underlying anxiety through encouragement to self-training that shall gradually transform the fear of the strange into an experience of capability. The best cure is prevention, education; its presupposition is the education of the educator.

The question of *the strangest,* fear of death, would likewise be solved. The problem is not to win life or to lose it but what to make of it.

If we follow the history of mankind in its attempts to make life worth living, to transform the strange always into the familiar and trustworthy and to get rid of anxiety, we find as the best solutions division of labor and social solidarity, religion, ethics, law, philosophy, and the rational methods of technique, civilization and culture.

EUGENE SHEN. *The Measurement of Relations between All-or-None Attributes.*

A statistical treatment of the relationship between two all-or-none attributes usually yields one single coefficient of what is called 'association' or 'colligation' as representing the total situation. This is an amalgamation of several relations. An analytic study of the relationship between two attributes, *a* and *b,* should raise four distinct questions. (1) To what extent is *a* a *sufficient condition* for *b*? (2) To what extent is *a* a *necessary condition* for *b*? (3) To what extent are *a* and *b* *mutually exclusive?* (4) To what extent are *a* and *b* *jointly exhaustive?*

It is readily shown that each of the four relations can be measured by some function of the frequency in one of the four categories, *a-b, a*-not-*b,* not-*a-b,* not-*a*-not-*b*. The proposed measure is the difference obtained by subtracting the observed frequency from the theoretical frequency (*i.e.* frequency to be expected upon assumption of independence between the attributes), divided by the greater of the two. This would give a coefficient within limits of plus and minus one, and would yield zero when the observed frequency equals the theoretical. The four categories corresponding to the four relations are: *a-b* for *mutual exclusion, a*-not-*b* for *sufficient condition,* not-*a-b* for *necessary condition,* not-*a*-not-*b* for *joint exhaustion.*

Investigations of available sets of data have shown that measures of these four relations make much more adequate representations than could a single measure of 'association' or 'colligation.'

Irene C. Sherman. *The Relation of Environmental Factors to the Reactions of the Insane.*

A study of 200 consecutive records of patients admitted to the Chicago Psychopathic Hospital was made to determine the relation of various abnormalities, such as paranoid trends, delusions and hallucinations, to birthplace, sex, education, occupation, religion and marital state.

Hallucinations were found to be most commonly of a religious nature. This type of hallucination was 14% more common in females than males. Grandiose delusions of a religious nature were also more common in females than males, occurring in the former with a frequency four times that in the latter. Grandiose delusions in general were twice as frequent in males as females. The most common delusion of grandeur among males concerned money or business. Not one instance of this type of delusion occurred in females. Grandiose delusions concerning money were twice as common in American born as foreign born; the latter are more likely to have delusions concerning professional or religious power. No grandiose delusions concerning inventions were found in the foreign born, but 9% occurred in American born. Of the total number of abnormalities occurring in each educational group, the percentage of grandiose delusions increased directly with the increase in the amount of education received. Of those who attended college, this type of abnormality was more common than any other. The relation between occupation and grandiose delusions was similar to that between education and grandiose delusions, those in clerical and professional groups having many more such delusions than domestics and laborers.

The most frequent type of paranoid trend concerned enemies. Ideas of injury by electricity, gas, hypnotism or poison were particularly common in females, compared with males. The percentage of paranoid trends was 18% greater in the married than in the single. These trends were most frequent in those with little education, and least in those who had attended college. A similar relationship held for those in unskilled occupations compared with clerical and professional groups. Paranoid trends were 13% more common in Jews than Protestants, but about equal in Jews and Catholics. Hallucinations, however, were most common in Protestants, occurring with a frequency of 34%, compared with 24% in Catholics, and 14% in Jews. Of the hallucinations in each group, 56% of those of Protestants, 27% of Catholics and none of Jews were religious in character.

MANDEL SHERMAN. *Phantasy Types: Their Relation to Conflicts and Hallucinations.*

An investigation of one hundred children below eight years of age showed that over ninety per cent displayed some form of phantasy. The phantasies of a large majority of these children were verbalizations of their play activities. For example, if a child played with a doll he talked to it and wove a story about it. This type of phantasy occurred irregularly, manifested itself mostly during play activity and the child could be diverted easily from this occupation. In a recent study on spoken phantasy this type was termed 'casual.' Another type of verbalized phantasy was termed 'systematic.' The children who showed this type of phantasy did not display the other, that is whenever their phantasies were verbalized they wove a complete story and their phantasies did not change from day to day or week to week.

In the casual phantasies the child occupied himself with various stories or make-believe play and the plot changed even from minute to minute. The systematic phantasies occurred mostly when the child was alone, most often immediately before sleep. Major conflicts were not found in casual phantasy but were invariably found in systematic phantasy. The systematic phantasies were expressions of conflicts and were attempts at their solution. In most cases the child developed a story in which he became the hero of the plot and although the verbalizations contained irrelevant subject matter the particular difficulty asserted itself constantly. The complexity of the plot corresponded to the intellectual status of the child.

Verbalized systematic phantasies are often the forerunner of auditory hallucinations of children. An analysis of the histories of a group of twenty-five children below twelve years of age who were brought for examination because of hallucinations showed that the first unusual behavior which the parents noticed was excessive verbalized phantasy. The subject-matter of these phantasies was concerned with the child's welfare. As these phantasies increased in frequency and as the plot became definitely systematized the hallucinations asserted themselves. At first the children considered the hallucinations, like the phantasies, as imaginary experiences but they gradually accepted them as real experiences.

Verbalized phantasies of the systematic type in young children are probably of etiologic origin similar to that of hallucinations. In a group of children with auditory hallucinations a history could be obtained in each case of the existence of a long period during which verbalized phantasies of a systematic type occurred regularly.

MARY SHIRLEY. *A Developmental Study of Walking.*

This study of walking is part of an infant-study program in which twenty-five Minneapolis babies have been examined in their homes once a week during their first year, and are still being examined at intervals of two weeks during their second year. Anthropometric and physical measures and tests of motor development and behavior comprise the series of examinations.

At each examination a graphic record of the baby's walking is obtained by greasing the soles of the baby's feet and having him walk on a strip of white wrapping paper; the oil-print record is dusted with lampblack which makes the footprints stand out clearly. The graphic records are then measured for total distance traversed, length of step, width of step, angle of step, and the total number of footprints are counted and the sequence of right and left prints are recorded. Analysis of these data indicate the following facts. 1. Most babies pass through four fairly well defined stages before they walk alone: (a) a stage of prancing or striding, in which the baby does not support his own weight, but in which he traverses a meter or more of distance; (b) a stage of standing with support; the baby bears his weight, and although he may sway somewhat he does not move out of his tracks during the one-minute interval; (c) a stage of walking with support; the baby walks several meters in one minute with the examiner leading him by both hands; (d) walking alone is usually preceded by standing alone.

2. The age at which each of these stages begins and the duration of each stage vary greatly from child to child.

3. Each baby has certain eccentricities in gait, length of step, in-toeing or out-toeing, or tendency to pat one foot or the other, which are characteristic of him and which persist over long periods.

FRANK K. SHUTTLEWORTH. *The Integration of Character.*

The integration of character is defined as the consistency of a child's behavior on a series of tests of character. The score on each test is expressed as a sigma-deviation from the mean of a given population. The standard deviation of these sigma measures for each child gives a measure of the amount of consistency or degree of integration of his behavior.

Data collected by Hartshorne and May on approximately 1,000 children in three school populations were employed. Sample facts from a study of the integration of honest-deceptive behavior based upon twenty-one tests of honesty are the following. Honest-deceptive behavior is highly specific; that is to say, for children in general there is comparatively little consistency or integration of behavior. There are measurable individual differences among children, but these differences are small. The well-integrated children are markedly more honest than the inconsistent children. There are exceptionally large population-differences in the amount of integration. Sex-differences are small. Older children are more consistent in their behavior than younger and this is true whether they become more honest or more dishonest. The associations of integration with intelligence, emotional stability, cultural and economic background, speed, and physical condition are comparatively low. The associations with suggestibility, persistence, inhibition, coöperation, and moral knowledge are comparatively high.

E. B. Skaggs and Solomon Grossman. *The Optimum Number of Readings before Introducing Reading-Prompting in Learning.*

Experiment I. Series of 8 nonsense syllables were exposed by means of a Shepard-Wirth memory apparatus. At any time the subject was engaged either in a straight reading (R) or in a reading-prompting (RP) process. Four conditions were investigated: (a) 1 R, then RP's until material was learned; (b) 3 R's, then RP's; (c) 5 R's, then RP's; and (d) 7 R's, then RP's. Eight subjects were used.

Results: (1) Considering total learning time, methods (a) and (d) were poorest, and (b) the best; (2) considering times needed for final successful recall, the results were the same as in (1); (3) considering number of RP's, it was found that 1 preliminary R necessitates 5.75 RP's, 3 preliminary R's necessitate 4.60 RP's, 5 preliminary R's necessitate 3.93 RP's, and 7 preliminary R's necessitate 3.80 RP's. This signifies the rapid onset of a law of diminishing returns for added preliminary R's.

Experiment II. Stanzas of poetry (Rossetti's *Rose Mary*) were used, and the four conditions or methods as of Experiment I. There were four trained subjects. Averages for each subject were based on ten or twelve stanzas learned by each method.

Results were the same as in the case of the nonsense syllables. One preliminary R was not enough and 7 R's were too many before introducing RP.

In general the work indicates that from 3 to 5 preliminary R's are the optimum number before introducing RP. The results of the work with the nonsense syllables were especially clear-cut and consistent in all cases.

D. Slesinger. *Some Methodological Problems Fundamental to a Proper Coördination of Law and Psychology.*

Frequently coöperative research implies an acceptance of the results of two or more disciplines with too little scrutiny of the methods by which these results were obtained. This is peculiarly the case when one of the disciplines is 'applied.' Concepts like *conditioned reflex* or *Oedipus complex* have been ruthlessly put to practical use in the field of education by numerous people who have little understanding of how the concepts were achieved.

Such a coördination in the field of legal psychology has brought about an unfortunate product. Occasionally a translation of terminologies is effected, but no way is paved for the acquisition of new light on the subject of human behavior which is the concern of both lawyers and psychologists. Because of rigid legal rules the psychiatrist on the stand is unable to tell what he knows about the individual at the bar of justice (at least under American law); because of an equally rigid psychological limitation legal postulates of behavior have seldom had adequate scientific study.

The classic method of Anglo-American legal research has been dictated by administrative rather than scientific considerations. Decisions handed down by appellate courts since about 1885 have been preserved in the most marvelously cross-indexed system in the history of thought. (Less systematic state reports, of course, date back several centuries.) The law on any point is discovered by a process of digging up these past opinions, differentiating, as far as possible, the present situation from those past ones that seem to be out of line, and predicting on that basis the way a modern court would react. Recently legal students, notably Professor Clark of Yale, have departed from the study of appellate decisions and turned to those of the trial court in order to apply statistical analysis to the situations handled by innumerable judges in the daily grist.

The Anglo-American legal psychologist, then, can make at least two uses of the materials of legal scholarship, one of which may be helpful to the law, the other to the science of human behavior. The first would be a social psychological study of judicial response. Assuming a relatively homogeneous group of judges with similar backgrounds, what are their typical stimuli and responses in court situations? The research would be in part historical, but chiefly along some such lines as are being developed under Dr. Dorothy Thomas of Teachers College and Professor Clark of the Yale Law School.

The second would involve a study of the theories of behavior acted upon by the courts in their handling of human situations, in the light of modern psychological analysis. It is to be expected, and indeed has proven true in some instances already examined, that a professional group interested from time immemorial in regulating human behavior will have stumbled upon scientific truth which it has no technique for verifying. In its attempt to control behavior a rough and ready art of prediction has been developed by the law. The discovery of its premises is a logical problem; testing their validity, a scientific one.

DAVID SLIGHT. *Hallucinations in the Sane.*

This is a study of hallucinations based essentially on a study of fifteen sane individuals and including considerations on hallucinations in general.

The cases fell into two groups: (1) hallucinations occurred throughout life; (2) hallucinations appeared for a short period. Visual and auditory hallucinations were noted. The former were more frequent. The essential state common to all cases was that often called 'over-tired.' In it mental activity continues involuntarily in the presence of fatigue. Sedative drugs caused the disappearance of the hallucination.

One common observation was that the hallucination persisted, often unchanged in form, over a long period as compared with the duration of an image. A waxing and waning of the hallucination was recorded by several cases exactly as occurs in the after-image. With reference to the apparent sensational vividness of many hallucinations, it would seem that the difference between image and hallucination is less dependent on any difference in the neural process in the particular cortical area involved than on the degree of dissociation of that process and a lowered activity of the rest of the cortex. An attempt to demonstrate eidetic imagery in several cases gave negative results, but it should be noted that treatment had been applied.

Several of the second group came to notice by seeking advice, being unable to free themselves from a belief in the reality of their hallucinations, apparently because of the marked sensational vividness. A distinction must be drawn between the tendency to accept it as real and the further question of interpretation of the hallucination by the subject. While the hallucination is being regarded as real, often in a dispassionate fashion, reasoning and memory may be brought to bear on it, resulting in a gradual dissolution of the reality appearance. For example, a visual hallucination changed from being three to two dimensional till it disappeared altogether.

In some cases of the first group there had been an early cultivation of meaning in spiritualistic terms. It is noteworthy in these, as in many psychotic individuals, that the sensational vividness was not marked and there was no confusion with material reality. Change in conduct apparently resulting from an hallucination is not dependent so much on the vividness, projection, and other features of the hallucination as on the general mental state.

C. S. SLOCOMBE. *The Nature of* g.

An attempt to discuss the nature of *g*, without reviewing all that has been said about it, seems almost to resolve itself into a statement of the things which are not known about it.

It is known definitely that a series of tests which are widely diverse in their nature, which are heterogeneous, will nevertheless intercorrelate. They may be so diverse that there does not appear to be any psychological explanation of their intercorrelation possible except the postulation of a *g* factor. Thus, in a sense, psychologists in postulating *g* are in a somewhat similar position to the physicists of twenty-eight years ago when they postulated the *ether*. This appears to be the situation. Questions of heterogeneity of groups, of sampling of abilities, of 'nature' *vs.* 'nurture,' *etc.*, ultimately reduce to definition of these terms rather than reveal anything of the nature of g.

The above statement is rather in consideration of the mathematical result which has led to the postulation of g. On the psychological side it seems that g is revealed more in the mental processes named by Professor Spearman as "noetic" than in any others. Thus it may be said that psychologically g is mainly concerned with noetic functioning. This is a loose statement, but the known facts do not warrant any more definite one. Problems of variation of clearness, of apprehension, of speed of educing relations, *etc.*, have not been determined to any extent.

It would almost seem in fact that g is an abstract principle postulated to explain facts otherwise inexplicable, but like all such principles brings its own difficulties of explanation,—and that, as the theory of relativity has in physics explained more satisfactorily than the theory of the ether the facts of physics, so some other theory will necessarily replace g to explain some of the facts of cognition.

FRANKLIN O. SMITH. *The Patellar Tendon-Reflex as Influenced by Sleep, Insomnia, Nicotine, and Hypnosis.*

The purpose of the experiments reported in this study was to determine as accurately as possible the influence of sleep, loss of sleep, nicotine, and hypnosis on the speed and extent of the patellar tendon reflex. In a preliminary study seventy-two subjects, students in general psychology, were tested and results were obtained to establish norms of speed and extent of the knee-jerk. The tests were made by means of a gravitational type of stimulus hammer which was connected in circuit with a Hipp chronoscope. The extent of the kick was measured in inches and tenths of an inch by means of a steel tape attached to the subject's foot.

The results show that the extent of the knee-jerk is independent of the speed of the reflex, as is indicated by the very low correlation of $+0.027$. The experiments yield positive findings as regards the influence of sleep and related conditions on both the time and the extent of the reflex. The results in every case are correlated with, and tend to support, the assumption that whatever acts as an excitant to the central nervous system increases muscle-tonus, and whatever acts as a repressant decreases muscle-tonus, as indicated by the knee-jerk. Data are presented to show quantitative differences between the normal and modified reflex.

W. F. Smith, see J. Peterson.

C. Spearman. *Creative Mind.*

Almost universally we find the mind portrayed as creative. Over this virtue more than all else has been lavished enthusiasm; but none of the present warring schools of psychology appears to furnish any reasonable account of the matter. I would therefore venture to submit the following explanation.

There have been shown to exist just three elementary processes (and corresponding laws) that are capable of evoking in the mind any item which was not there before. The first consists in that an experience is wont to be, so to speak, shadowed by an awareness of it. " I not only feel, but I know that I feel," said Augustine. Here, creativeness is in its lowest degree; the process does no more than exhibit what is already happening. Our second process and law is the one which has been so strangely neglected by most psychologists just because of its omnipresence and obviousness, namely the cognizing of relations. But even here the creativeness is small. For relations are, after all, but tenuous things in comparison with the fundaments which they conjoin. I create a relation every time that I lay one particle beside another. Of a very different order would be my achievement if I could create either of those particles themselves. But then comes the third process and law. This does create fundaments. For it consists in that from a single fundament plus a relation the mind can proceed to the correlative fundament. Thus, on seeing an elephant and being told to imagine an animal many times larger, I can actually do so, in spite of never having really seen anything of the kind.

In order that the preceding doctrine of creativeness should be verified and appreciated, it has to be applied. Its truth and worth must stand or fall by whether it actually helps us to understand events, to prophesy them, and to control them. And certainly, at any rate, the relevant events possess an enormous extent. First to be thought of, naturally, are the exalted creations of the fine arts. But by many authorities no less originality is conceded to the sciences also. And a case may be made out that play, imitation, and even sympathy, fall largely within its scope. More patently, it comprehends all initiative in behavior. Nor can its pertinence be denied to hallucinations, illusions, and, in particular, dreams. Indeed, with more reflection we can make it responsible for the loftiest flights of metaphysics.

Out of this vast domain of application, however, the time at our disposal limits us to a single illustration. And this I will select from the province of *behavior,* using for the purpose a recent research of Professor Laycock.

C. SPEARMAN. *The Laws of Psychology.*

Whatever else may be needed in order to rescue psychology from its present "crisis," the all important requirement is that it should be founded upon scientific laws. And here the difficulty is not so much that no laws have yet been enounced; it is rather that several have been so which appear to conflict with one another. To overcome this grave obstacle to progress, the following suggestions are offered:

As an illustration, let us take, on the one hand, the fundamental law recently proposed by the Berlin school of *Gestalt,* and, on the other hand, the pair of laws advocated a few years ago by the school of 'noegenesis.' The Berlin law asserts that "any configuration will become as perfect as the prevailing conditions admit."[1] The other school covers more or less the same ground: "(a) Two or more items of mental content tend to evoke knowledge of relation between them. (b) An item together with a relation tends to evoke the idea of the correlative item."

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[1] K. Koffka, Ped. Sem., 1925.

Now, in order to settle the opposition between these two doctrines, the first thing needful is to clear away all merely verbal difficulties. We may note that the noegenetic school is here using the word *relation* in a far broader sense than that in which it would appear to be understood by the other party. It takes the word to apply, not only to the case where the relation is cognized explicitly in more or less abstraction from the related items, but also to the case where the relation and the items are cognized implicitly in one concrete whole. The older or ' Austrian ' school of ' Gestaltists ' had been well aware of these two meanings of the word relation; they had indeed said that the narrower one is usual in the German language, but they had gone on to propose that the broader one should be adopted as a great improvement. For my own part, I am inclined to think that at any rate in the English and most other languages the broader sense of the word has always been the more customary. Waiving this point, however, all that is at present needed is that the two different usages of the word should be clearly recognized. By this simple means one of the greatest sources of discord between the two schools would at once be eliminated.

There are other equivocalities where the source of mischief is perhaps not confined to the words used, but may extend in some degree to the ideas themselves. To exemplify this, let us consider the general nature of a law of sequence. It asserts that some given earlier phase is uniformly followed by some given later phase. Now, in the noegenetic laws, these two phases, earlier and later, are defined precisely and restricted within narrow limits. The earlier phase is either (a) two or more items of mental content,[2] or (b) an item together with a relation. The final phase is in both cases the two items *in* their relation. Turn, on the other hand, to the *Gestalt* law. Here the earlier phase is an " imperfect configuration," whilst the later one is a " perfect configuration." The meanings of both of these expressions are hard to guess. In particular, we are sadly at a loss to know whether either or both are intended to mean anything substantially different from the noegenetic phases.

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[2] As a limiting case of plural items may here be taken the constituents of a continuum.

But besides all such discrepancies of view which are due to obscurity of word or of thought, there are also those which only involve difference of emphasis. Thus, much of the analysis introduced by the noegenetic laws and seemingly rejected by the Berlin 'Gestaltists' is nevertheless, according to rumor, not declared to be invalid by the latter, but only said 'not to interest them.' If this attitude were frankly admitted, then all real dispute would be at an end. The two parties could work side by side, the one with the analysis and the other without it. No other opposition would need to occur between them than a generous rivalry as to which can produce the better scientific harvest.

After thus clearing up all such matters which merely cloud the real issue, then at last we could with profit turn to any genuine contradiction, any clash in respect of definite observable or deducible facts. For such genuine conflict the obvious treatment is further research. And this in most cases—after the preparatory clearing of the ground—has very good prospects of being decisive.

What has here been illustrated by one particular case of rival doctrines might perhaps be extended, *mutatis mutandis,* to the bulk of the present unprogressive controversies. In such a manner we might possibly make a wonderful stride forwards towards the great common goal: that of rendering psychology a genuine science, not merely "the hope of one."

RALPH B. SPENCE. *The Relation of Age to Tests of Mental Ability.*

In connection with tests given to students at Teachers College, Columbia University, there was some criticism that tests which called for mathematical ability were unfair to the older students. In order to test this hypothesis students from different age-groups from 20 to 50 years were matched on the basis of paragraph-reading ability, and the scores in the sub-tests requiring mathematics and general information (questions from physics, chemistry, literature, art, biology, *etc.*) were compared. There was no tendency for the younger groups to excel. The group over 40 years had a slightly higher score than the group under

25, although the difference was not statistically significant. There was no way of telling the amount of selection operating with regard to the ability of different ages, but correlations on the same population between age and different parts of the Thorndike test for high school graduates were all very close to zero. The CAVD test and a vocabulary test showed slight positive correlations with age for the same or similar populations.

I. Spielrein. *Psychotechnics in the U. S. S. R.*

I had it in mind to talk about the forms of organization of psychotechnics in the Soviet Union and to describe all the important institutions. However, such a report is little suited for an oral presentation. Besides, I spoke at some length yesterday before a number of distinguished representatives of applied psychology in America about the conditions of organization in our industry and about the part which applied psychology is taking in its reorganization.

I will confine myself, therefore, today, to merely touching on this extensive field and will deal somewhat more fully with a few working methods which through their originality might be of interest in this country also.

I must mention first that in accordance with the general tendencies in our country all productive work, including scientific and most of all psychotechnical work, is being done in forms organized by the Government, and this not only in the army and the communication system but also in industry. In all these three fields research work and its application is being directed by so-called counsels for psychotechnics or for psychophysiology, and is being done only in state institutions.

The following work must be mentioned especially.

In the Ukraine there is the widespread work of the All Ukrainian Institute for Protection of Labor (Kharkov), where Dunaevsky and Syrkin are directing the psychotechnical work. This institute, after having investigated several American and Spanish methods of intelligence tests, has worked out its own system of intelligence tests in order to establish from tens of thousands of these tests normal values for different groups. The theoretical interest of the scientists of this institute is centered in the establishment and proving of the "river beds," as they call it, of the intelligence, among which they discern the verbal, morphic, technical, *etc.,* and in the establishment of units by which intelligence can be measured.

It is self-evident that such a trend of interests must bring about a special development of the mathematical methods of scoring and rating. Thus Kharkov has become the center of the mathematical school of applied psychology in the Soviet Union. Problems of constancy, stability, reliability, of equal and relative difficulty, are mostly investigated there. Besides Syrkin, Mandrika must be named there as one of the distinguished scientists in this field. In the *Russian Republic* the purely psychological school predominates against the mathematical school. I will not enumerate different investigations because in spite of their great practical importance, they hardly offer any interest as a matter of new principle,—for instance, vocational selection in industry and in the communicating system, which is handled in Leningrad by Borouk, Clerk, and Lewin, and in Moscow by Lewitoff, Frolow, and Kholodnaia.

I will mention also several investigations directed by me in the matter of mass influence as they seem to me to be methodologically new. For instance, a thorough analysis of the safety posters has been made. We have found that not the 'bloody' ones, predominating in Russia, but the 'humoristic' posters, which are characteristic for America, are better understood and have greater influence. Thus the posters which are being produced at the present time have been improved. The analysis of stenograms, taken in meetings of peasants, workers and red soldiers, as compared with stenograms of speeches of the 'educated' and writers, show that the vocabulary and the grammatical structure of the sentences changes in connection with the training of the speakers. The more educated the speaker, the greater the percentage of nouns in his speech, the smaller the frequency of verbs. Uneducated people talk in sentences longer than those of the educated, but poorer in thought. They have, as we say, 'a lower capacity of thought.' After having established these rules we could increase the intelligibleness of the juridic laws for the peasants by 40 to 90 per cent (as has been proved experimentally). We did that only by substituting verbs for many nouns and by expressing the laws in sentences, each of which did not have too many new ideas.

I want to add that measurements of fatigue made by psychologists are having an increasing importance for our industry, especially in connection with female labor, with the three-shift work and seven-hour day, and with the introduction of the continuous flow.

There remains to be said that it is psychotechnics which gives most of the inspiration to the development of the psychological theory of the dialectic materialism which can be observed in the U. S. S. R. today more than ever before.

HAZEL M. STANTON. *Psychological Tests, a Factor in Admission to the Eastman School of Music.*

Musical talent as measured in terms of musical capacities is proving to be of significant value in the prognosis of musical achievement. As a result of studies in progress at the Eastman School of Music, a gradual adjustment is taking place in the critical score for admission to that music school as determined by psychological tests.

Three groups of students, designated as the preparatory, the special, and the regular course, comprise the 2,000 enrollment of the Eastman School. Since the establishment of the school in 1921, measurement of the musical capacities of these groups of students by means of the Seashore Measures of Musical Talent has taken place.

A specific program of admission has developed for the regular course students, since Howard Hanson has been director of the school. These students are candidates for the bachelor of music degree and the Eastman certificate of music. Psychological tests as a factor in this program of admission will be discussed in this report in the light of the most recent developments in the establishment of a critical score for entrance. From a cumulative key of test combinations it is possible to transfer test results into a five-fold classification. In this five-fold classification, expressed in terms of 'Safe,' 'Probable,' 'Possible,' 'Doubtful,' 'Discouraged,' the present critical score for entrance falls between the 'Doubtful' and 'Possible' groups.

E. D. STARBUCK and IVY HUSBAND. *Space-Time Forms Determining Philosophical and Religious Beliefs and Attitudes.*

The trouble started fifteen years ago in a Kant seminar. One-third of the group insisted that the four classic proofs that time and space are each forms of perception were void and that the logic employed in the antinomies was unconvincing. Another third of the seminar defended the arguments. The remaining third were uncertain. In the midst of the wrestling it appeared that the defenders of Kant employed rather distinctly visual pictures of time and space, while his critics interpret these two basal concepts in terms of organic and kinesthetic imagery.

Progressively through the years it has been found possible by the use of point-scale self-rating devices to discover men and women of four types of mental imagery, namely, the visual, the kinesthetic, the visual-kinesthetic, and the kinesthetic-organic. It has been possible also to separate these persons into groups according to certain fundamental types of religious and philosophical belief and attitude. There is about 85 per cent agreement in the classification when done by different persons. There is found to be a high correlation running often to the extent of 0.80 between the space-time form and certain religious and philosophical attitudes. A sufficient number of representatives of the different groups are now being run through an extensive battery of laboratory tests in order to secure bodies of objective data for the sake of more minute analysis and for determining reliabilities.

HENRY E. STARR. *A Metabolic Study of Reaction and Recall.*

The present research, begun at the University of Pennsylvania and continued at Rutgers University, has grown out of an earlier study on *Motivational Types as Illustrated by Respiratory Graphs,* reported to the American Psychological Association in 1927.

The subjects of this later study were human adults or late adolescents. A standard metabolism apparatus was employed with a simple modification in technique, making it possible to study the effect upon reaction, retention, and recall under conditions of oxygen-deficit in the absence of undue CO_2 stimulation and with the subject breathing, comfortably and unwittingly, increasing quantities of an inert gas. Graphic records were obtained, showing rate and depth of respiration and concomitant oxygen consumption, during a period in which the oxygen supply was diminished to the point of producing collapse of the subject. Throughout the period various stimuli were presented to the subject and his responses recorded. Upon restoration to consciousness, the subject immediately gave an oral report of the "last things that occurred" prior to his liberation from the apparatus. Finally, questions, leading and misleading, were asked him relative to later stimuli to which he had reacted, but which he had failed to report. His ability or inability to recall and the point at which his obliviscence began were noted.

The psychological sequence runs thus: (a) reactivity with retention, indicated by subsequent recall; (b) reactivity (even apparently 'purposive') but without retention indicated by subsequent inability to recall; (c) collapse; (d) restoration with recall of events and reactions prior to second stage mentioned.

It is this second stage which is of peculiar psychological import. It is a stage of inadequate oxygenation, with little or no physical discomfort, resulting in reactivity without retentivity. The subject at this stage is an organism capable of reacting with behavior patterns indicating cortical activity, but incapable of retention, incapable of acquiring new patterns, incapable of learning. The general findings are in accord with observations reported by various physiologists in the course of their studies of respiration at low oxygen pressure in steel chambers. A statistical analysis of the data obtained in the present research indicates individual differences in reaction at specific stages of oxygen consumption.

This paper is obviously tentative, inasmuch as the ramifications of the problem of the relation of oxygen-consumption to reaction, retention, and recall extend throughout the fields of theoretical, experimental, and clinical psychological study.

WILLIAM STERN. *Zum Begriff der Intelligenz.*

Die von mir früher aufgestellte Definition der Intelligenz ist jetzt folgendermassen abgeändert worden: " Intelligenz ist die Fähigkeit, sich unter zweckmässiger Verfügung über Denkmittel auf neue Forderungen einzustellen."

Diese Definition enthält zwei Momente: ein rein psychologisches: Besitz bestimmter Denkinhalte (Begriffe, Urteile) und die Fähigkeit, Denkakte bestimmter Art (Vergleichen, Verstehen, Kombinieren, Abstrahieren) vollziehen zu können. Und ein " Personales ": die zweckmässige Verwendung dieser Denkfünktionen im Sinne bestimmter Lebensaufgaben des Menschen. Das zweite Merkmal ist das wesentlichere. Ein Mensch ist nicht intelligent, weil er denkt, sondern weil er dort denkt und so denkt, wo und wie es jeweilig die Neuheit der Situation von ihm fordert. Unter Umständen kann ein Zuviel an Denken einen Mangel an Intelligenz verraten. Das richtige und sparsame Verfügen über die Denkmittel ist selbst nicht mehr Ergebnis des Denkens, sondern bildet den wichtigen unbewussten personalen Anteil an der Leistung der Intelligenz.

Intelligenz ist nicht eine blosse Summe von unzusammenhängenden Einzelfunktionen, sondern etwas Einheitliches; sie drückt das geistige Niveau des Menschen aus. Aber dies " Niveau " ist keine Ebene, sondern modelliert, indem—je nach der Besonderheit der Person—gewisse Seiten der Intelligenz stärker, andere schwächer entwickelt sind. Deshalb ist die Messung der Intelligenz durch eine einzige Niveauziffer (IQ) nur die allerroheste Annäherung an eine Erfassung der persönlichen Eigenart. Zur Messung muss hinzukommen: (1) die psychologische Analyse der Intelligenzleistung im einzelnen; (2) die Feststellung der eigentlichen Struktur der Intelligenz (ob mehr analytisch oder synthetisch, mehr spontan oder reaktiv, mehr praktisch oder gnostisch); (3) die Einordnung der Intelligenz in die Gesamtheit des persönlichen Lebens (Beziehung der Intelligenz zu Trieb und Neigung, zu Gedächtnis und Willen).

Obige Gesichtspunkte werden an dem Beispiel der " praktischen Intelligenz " illustriert.

WILLIAM STERN. *Starre und freie Testserien.*

Immer deutlicher haben sich im letzten Jahrzehnt zwei Anwendungsweisen von Testreihen unterschieden: die starren und die freien Reihen; jene haben hauptsächlich in Amerika, diese in Deutschland ihre Ausbildung gefunden.

Die " starren " Systeme arbeiten mit einer ganz bestimmten immer wieder in genau gleicher Weise zu benutzenden und zu verrechnenden Zusammenstellung von Tests. Sie haben drei grosse Vorzüge: sie können zu Massenuntersuchungen verwandt werden, die wichtige statistische Ergebnisse liefern; sie geben feste Normen, an denen der an einzelnen Individuen gefundene Ziffernwert ohne weiteres gemessen werden kann; sie erleichtern die Anwendung, da der Prüfer bald sichere Routine in der Handhabung der Tests und der Ausrechnung der Ergebnisse gewinnt. Ihre Nachteile sind: Gefahr einer Mechanisierung, Mangel psychologischer Vertiefung in die Ergebnisse, Bekanntwerden der Aufgaben im Kreise der künftigen Prüflinge.

Die " freien " Prüfreihen werden von Fall zu Fall aus dem vorhandenen Vorrat von Tests zusammengestellt und durch neue ergänzt. Sie erlauben nur, die damit geprüften Individuen unter einander zu vergleichen, da keine feste Norm vorhanden ist, stellen auch viel grössere Anforderungen an Zeit und Kraft des Psychologen. Aber sie haben eine Reihe sehr wichtiger Vorzüge: Anpassung der Tests an die psychologischen Erfordernisse der jeweiligen Untersuchungsaufgabe; eingehende psychologische Analyse und personale Deutung der Ergebnisse; zwanglose Verbindung der Testprüfung mit andersartigen Methoden, z. B. solchen der Beobachtung, der klinischen Untersuchung, des normalen Schulbetriebes; Verhinderung eines vorherigen Bekanntwerdens der Prüfaufgaben. Die freie elastische Gestaltung der Testreihen schützt den Psychologen vor Mechanisierung; er gewöhnt sich daran, in den Testergebnissen nicht nur Ziffernwerte, sondern Symptome für wesentliche Züge der Persönlichkeit zu sehen.

William Stern. *Die Wissenschaft von der menschlichen Person.*

Wir haben viele Wissenschaften von der menschlichen Person (nämlich von ihrem psychischen, ihrem organischen, ihren kulturellen, ihrem sozialen Leben), aber wir haben noch nicht *die* Wissenschaft von der menschlichen Person. Doch ist eine solche im Werden. Seit 3 Jahrhunderten ist der Mensch wissenschaftlich zerteilt gewesen und verteilt worden auf verschiedene Disziplinen. Jetzt aber nötig ist die entschlossene Anerkennung, *dass der Mensch in seiner ungeteilten personalen Ganzheit Objekt der Wissenschaft sein muss,* und dass erst von einer solchen " Person-Wissenschaft " oder " Personalistik " aus die Teilgebiete der Psychologie, der Psysiologie, der Biologie, der Kultur-Wissenschaft des Menschen möglich werden.

Die Beachtung der Ganzheit ist der grosse gemeinsame Zug fast aller neueren wissenschaftlichen Bestrebungen, die der Erkenntnis des Menschen gelten. Aber der Begriff der Ganzheit ist noch unbestimmt. Wir müssen ihn umgrenzen, damit wir wissen, worin sich die " personale Ganzheit " von anderen Ganzheits-Kategorien z. B. Gestalt, Struktur, unterscheidet.

(1) Die personale Ganzheit ist (wie jede Ganzheit) *" unitas multiplex."* Sie ist weder Einfachheit noch blosse Mannigfaltigkeit der Momente, sie fasst vielmehr alle Momente, die zu ihr gehören, zu einer geschlossenen Einheit zusammen. Die Momente in ihr sind zugleich " abgehoben " und " eingebettet."

(2) Die personale Ganzheit ist *Selbstbestimmung.* In ihr besteht eine eigentümliche Zurückbezogenheit auf sich selbst; sie is für sich selbst Mittel und Zweck, Ursache und Wirkung.

(3) Zugleich aber hat die personale Ganzheit *Welt-Offenheit;* sie steht im Austausch des Wirkens und Bewirktwerdens, des Sinngebens und Sinnempfangens mit der Welt. Doppelt macht sich in der personalen Selbstbestimmung der Faktor " Welt "

geltend, als "Vorwelt" (Vererbung) und als "Umwelt" (direkter Aussen-Einfluss).

Eine eigene Kategorienlehre ist nötig für die "personale Umwelt," die sich deutlich von der physikalisch-mathematischen Welt unterscheidet. Umwelt ist für die Person (a) unmittelbare Biosphäre, (b) die Welt der sich abhebenden (materiellen und geistigen) Objekte, (c) die dramatische Welt der Mitmenschen und Gemeinschaften.

(4) Die personale Ganzheit ist *Gestalt und Ungestalt, Struktur und Vieldeutigkeit* zugleich. Die "Gestalten" und "Strukturen" sind nur die am meisten abgehobenen isolierbaren Momente des persönlichen Lebens. Sie haben ihren Ganzheits-Charakter nicht aus eigener Kraft, sondern von der Ganzheit der Person her, zu welcher sie gehören. "Keine Gestalt ohne Gestalter." Auf der anderen Seite sind diejenigen Momente der Person, die ihr besonders innig eingebettet sind, eben deshalb auch nicht als durchgegliederte "Gestalten" gegeben. Ihre "Ungestaltheit" und "Diffusität" ist nicht ein Mangel, sondern positive Personennähe, vieldeutiger Reichtum von Möglichkeiten.

(5) Die personale Ganzheit hat *Tiefe,* d. h. Grade des Abstandes von der Oberfläche, mit der sie im Kontakt zur Welt steht. Auch diese Tiefe ist *unitas multiplex;* sie enthält zwar "Schichten" verschiedener Tiefenlage in sich, aber diese sind nicht streng abgesondert gegeneinander, sondern ineinander verschränkt und verschmolzen zur einheitlichen Tiefendimension. Erst recht unberechtigt ist es, eine einzelne von diesen Tiefenschichten, etwa die sexuelle Triebhaftigkeit zum "Personkern" zu machen.

(6) Die personale Ganzheit ist *psycho-physisch neutral.* Ihrem Wesen nach einheitlich, gibt sie sich in doppelter Weise kund: nach Aussen als Leben (physisch), nach Innen, für sich selbst, als Erleben (psychisch). Zwischen beiden Manifestationen besteht nicht eine mechanischer Parallelismus, sondern ein teleologischer (Zweck- und Sinn-) Zusammenhang.

Das unmittelbare personale Leben aber hat einen viel weiteren

Umkreis als das bewusste Erleben, bewegt sich in Tiefen und Höhen, die nicht in die Bewusstseins-Oberfläche hineinragen. So hat hier auch die Kategorie des ' Unbewussten ' ihren Platz.

GEORGE D. STODDARD. *Concerning Some Ages, Indices and Quotients in Child Development.*

It is well known that the concepts of *mental age* and *intelligence quotient* are none too clear, when applied to adults, because of our dependence on either extrapolation of findings from mental tests for children or generalizations not founded on tests at all. On the other hand, both practical and theoretical difficulties are encountered in the case of infants and young children. For example, a difference of a few weeks in the length of the antenatal period may result in a difference of several months in the infant's physiological status at a given age, and conceivably in his mental ability. Again the scarcity of tests, which are either *mental* for the first two years or highly correlated with results secured from mental tests when the child is older, results in great unreliability. Nutritional differences, subjectivity of tests, coarse scoring units, and absence of the interplay of language between child and examiner constitute special difficulties at this age.

It is suggested that some attention be paid to the *denominator* in interpreting IQ's at the early levels; *i.e.* to the fundamental factors in non-mental growth which mere chronological age reflects only imperfectly. We can build up a concept of ' brightness ' in which the denominator of the quotient becomes an estimate of the physical maturity of the child. Then we should consider the feasibility of a *potential IQ*—the highest brightness quotient which optimum environmental conditions can produce for a given child. Thus the PIQ for cretins would be considerably above the obtained IQ's (before thyroid extract treatment). Similarly the PIQ for a ten-months' term infant might be significantly lower than his obtained IQ, assuming that his early advantage would be lost.

Refinements of measures are needed in certain aspects of child development. Norms, and better still, desirable standards, are essential. Moreover, if such standards are to be useful in dealing with individuals, we should work toward analytical refinements rather than build up great masses of data on poorly-sampled populations. This will call for finer categories of race, family and station in combination with medical, dental, and psychological estimates in passing on such a thing as the desirable weight for a child at a given age.

Thurstone's proposal to use percentiles more extensively in mental measurement may well have more general promise in child development, and L. K. Frank's suggestion that a large number of traits be plotted on a circular graph with the distance along the radii representing scores (*e.g.,* z-scores) may be a means of focusing many trait measurements.

C. S. STOLTENBERG and F. S. FEARING. *Development of Post-Rotational Head Nystagmus in Squabs.*

Squabs, 5, 10, 20, 35, and 90 to 120 days old, were used for the experiment. Each age group was represented by approximately the same number of birds. Each squab was subjected to a series of ten rotations. Clockwise rotations alternated with those in counter-clockwise direction. Each rotation consisted of ten turns accomplished in a period of twenty seconds. Comparison of the data show that there is an increase both in the time, and in the number of head-movements from the age of 5 days to 35 days, after which there was apparently no change.

KARL R. STOLZ. *Implications for Religion of Current Movements in Psychology.*

1. The teaching of *psychoanalysis* that religion is altogether a sex-manifestation is open to serious objection. In their emphasis on pathological disturbances created by repressions, the Freudians tend to overlook the positive values of inhibitions dictated by religion and other social pressures. On the other hand, psychoanalysis has disclosed the function of religious confession, which Protestantism up to recent times has largely neglected, and the strategic importance of the religious training of the young

child. Moreover, it has formulated methods by which the hidden motives from which men act may be laid bare, and it has advocated the sublimation of crude traits of human nature.

2. As a movement Watsonian *behaviorism* has on the whole been an enemy of religion. According to this psychological theory nothing is real save reflexes variously associated and conditioned. The moral struggle is unreal in a world fatally articulated. Religion arose through the attempts of charlatans who were too lazy to work with their hands, in an effort to control others for selfish ends. Ethically this movement advocates an extreme empiricism and pragmatism, which take insufficient account of the moral insights and experiences of the great leaders of the past.

3. *Dynamic* psychology lends support to cherished religious doctrines. Its frank espousal of purposiveness is encouraging. Its dynamic conception of all consciousness makes of religion a fundamental drive, inspiring and regulating life. It interprets the creativity of religion in terms of art, rites, doctrines and conduct.

4. *Gestalt* psychology would condemn the atomistic approach to religion. It would consider religion in a frame of reference. It would evaluate religion in the light of its setting in individual and group experience. Apart from its relationship religion has no meaning or function. Religious pedagogy in its use of the project method utilizes a *Gestalt* conception.

C. L. STONE. *Effect of College Instruction on Belief.*

In a questionnaire given in a representative college, both at the beginning and at the end of the first semester, to freshmen, half of whom had a course in the problems of citizenship, and the other half a course in evolution and modern science, it was found that religious ideas were about equally affected by the two courses; that religious ideas changed no more than economic or political ideas; that views on immortality and the value of religion changed less than opinions concerning prayer and God. The data give little support to the current notion that the freshman year upsets religious ideas radically.

CALVIN P. STONE. *Congenital Sexual Behavior and Maze-Learning in Rats with Cortical Lesions.*

Anosmic rats displayed sexual behavior associated with begetting and caring for offspring that differed in no observed respect from those of normal animals. These same animals were significantly defective in maze-learning.

Cortical lesions of small extent gave rise to no observed changes in copulatory pattern or in maternal behavior; in these same animals, however, there were marked deficiencies in maze-learning ability. Gross lesions embracing 50% or more of the cerebral cortex did not suppress copulatory activity in animals maintained in good states of nutrition, yet varying degrees of defect in maternal behavior were associated with these gross lesions. Likewise, gross deficiencies in maze-learning ability were found. The obtained evidence supports the belief that *so-called* native responses are mediated primarily by sub-cortical brain centers and that they are less dependent upon the cerebral cortex for their initial appearance and maintenance than are the non-native (learned) responses. A maze of medium difficulty will detect deficiencies arising from cortical lesions when native sexual responses reveals none.

GEORGE MALCOLM STRATTON. *Emotions in Women and in Men.*

The present study is based upon evidence gained by a method previously described.[1] It attempts to answer the following questions. With regard to the connection between emotion and the incidence of disease, does this connection hold alike for men and for women? And apart from this, is there a difference of intensity in the anger-responses of men and of women; and are those of men the stronger or are they the weaker? And similarly of fear.

The evidence indicates that with respect to emotion and disease, it is probable that men and women are alike in that persons whose history involves disease give stronger anger-responses than do persons whose history is free from disease. And men and women are alike, again, in showing no clear connection between fear and the incidence of disease. For fear, neither sex reveals the connection; for anger both sexes reveal it. In each case the sexes are alike.

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[1] Anger and fear: their probable relation to each other, to intellectual work, and to primogeniture. *Amer. J. Psychol.*, 39, 1927, 125.

As to the relative strength of emotion in men and in women, it appears that in situations likely to cause fear the average woman's fear is more intense than that of the average man,—in accord with the common belief that women are in general more timid than men. But with regard to anger, the popular belief that anger is a more characteristically masculine response seems contrary to fact. In like situations provocative of anger, the average woman's anger is not merely as intense as the man's it is somewhat more intense than his. Natively, perhaps then, man is weaker both in his fear and in his anger. Man's reputation for greater anger is doubtless due to society's permitting or even encouraging his overt expression of anger, while in women this is frowned upon without, and possibly is opposed by stronger native impulses of sympathy within.

CARL STUMPF. *Zum Grundgesetz der assoziativen Reproduktion.*

Brentano hat in Vorlesungen als allgemeinste Regel der Reproduktion auf Grund von Assoziationen die folgende ausgesprochen: "Jede Empfindung und jede Vorstellung hinterlässt eine Disposition, welche die Entstehung einer ähnlichen Vorstellung unter ähnlichen psychischen Umständen begünstigt." Bezeichnet man die frühere Vorstellung mit V, die spätere mit v, die früheren Umstände mit U, die späteren mit u, so kann man schreiben: $(U — V) \longrightarrow (u — v)$.

Was man als Gesetz der Ergänzung oder der Berührung ausspricht, läuft auf dasselbe hinaus, nur ist es weniger allgemein und genau formuliert. Aber auch die sogenannte Reproduktion durch Aehnlichkeit fällt unter die nämliche Regel. *Jede* Reproduktion beruht *sowohl* auf Aehnlichkeit (zwischen U und u) *als* auf Berührung (zwischen U und V).

2. Dass jede Empfindung und Vorstellung eine Disposition im obigen Sinne hinterlässt, kann man als ein Gesetz im strengen Sinn bezeichnen. Aber der Begriff der Disposition lässt ebenso wie der der Aehnlichkeit zahllose Gradunterschiede zu. So sind denn auch genug Faktoren bekannt, wie Aufmerksamkeit, Einstellung, Konstellation, welche im einzelnen Falle den Ausschlag geben. Unter diesen Einflüssen galt bis vor Kurzem als ein besonders wechtiger die *Anzahl der vorausgegangenen Wiederholungen.*

Gegen diese Lehre von der fundamentalen Bedeutung der Wiederholungen für das Gedächtnis hat Lewin auf Grund sorgfältiger Versuche mit sinnlosen Silben Einspruch erhoben. Ihm zufolge sind Wiederholungen nur dann von Einfluss, wenn eine bestimmte Tätigkeit durch Wiederholungen eingeübt wird. Dasselbe fand Hanfmann (1927) in Bezug auf visuell dargebotene Figuren, und Gottschaldt (1926, 1929) hat auf Grund von Versuchen über das Gestalterkennen gegen den Einfluss der blossen Anzahl vorausgehender Wahrnehmungen Stellung genommen.

Gleichwohl können diese Ergebnisse uns nicht veranlassen, die alte Lehre von der Assoziation aufzugeben, sondern nur sie genauer zu formulieren. Wir dürfen unter der Assoziation nicht verstehen die blosse Tatsache der Aufeinanderfolge oder Gleichzeitigkeit im Bewusstsein, sondern die beiden Bewusstseinsinhalte müssen als Teile eines Ganzen vorgestellt sein. Je zahlreicher und je wesentlicher die Beziehungen der Glieder unter einander, um so kräftiger fand man die Assoziation. Zwischen diesem 'intellektuellen' Gedächtnis und dem 'mechanischen' ist nun aber keine Kluft, sondern das mechanische ist nur ein Grenzfall, die unterste Stufe des intellektuellen. Ich nehme an, dass Wundt bei der Betonung der Apperzeption für den Lauf der Vorstellungen das nämliche im Auge hatte. Auch Poppelreuter hat bereits 1915 auf die Bedeutung der "Auffassung" in diesem Sinne hingewiesen. Und wenn man Lewins Begriff der "Tätigkeit" weit genug nimmt, so dass er jede Art von psychischer Betätigung, auch die rein unwillkürliche, umschliesst, dann dürfte seine These gleichfalls darauf hinauslaufen. Dann ist also 'Assoziation' nicht mehr ein blosses Wort für eine unbekannte und unerforschliche Art der Verknüpfung, sondern ein Begriff, der durch Aufzeigung von Bewusstseinserscheinungen erläutert werden kann.

Im Falle des Wiedererkennens von Gestalten darf man nicht übersehen, dass eine zuerst isoliert dargebotene Gestalt, wenn sie später als Teil einer komplizierteren Gestalt auftritt, dabei ihrer ursprünglichen Umgebung verlustig geht, mit der sie seiner Zeit ein Ganzes in der Wahrnehmung bildete. Die häufig wiederholte Darbietung in der ursprünglichen Umgebung dürfte daher eher ein Hindernis des Wiedererkennens schaffen.

Mit Rücksicht auf diese Erwägungen könnte man der Brentano-Formel folgende Fassung geben: "Ist ein Bewusstseinsinhalt als Teil eines Ganzen aufgefasst worden, so bleibt eine Disposition zurück, welche die Entstehung eines ähnlichen Ganzen beim Vorhandensein eines ähnlichen Teiles begünstigt." Kürzer, doch weniger genau: "Der Teil reproduziert das Ganze"—die alte, schon von Augustinus aufgestellte, von Hobbes, William Hamilton, Lotze u. a. wiederholte Formel der *Ergänzung*. Der Unterschied zwischen Simultan- und Sukzessivassoziation und den darauf bezüglichen Einzelgesetzlichkeiten wird natürlich damit nicht geleugnet.

I. L. G. SUTHERLAND. *The Study of Maori Mind.*

The object of the paper is to examine some recorded opinions and current assumptions regarding Maori mentality, to discuss briefly present-day theories of native mind and to outline a mode of approach to the scientific study of the mind of the Maori.

From the days of the first contact of Europeans with the inhabitants of New Zealand (in the last quarter of the 18th century), there are on record observations and general impressions concerning the native mind and character. Some were recorded before there had been much serious disintegration of Maori culture. In judging later opinions this latter factor must be increasingly taken into account as the 19th century proceeds.

Observers were shocked at such enormities of custom as cannibalism and intense blood-thirstiness in warfare, but the splendid physique of the race, their dignity and grace of bearing and their general intelligence were so impressive that again and again we find the chiefs and the people as a whole described as noble. The Maori received the materials of civilization with an astonishing eagerness, especially those which had reference to their own strong mental configurations, *e.g.* weapons of war. But their 'civilizing,' as it proceeded, was unsuccessful and their numbers rapidly decreased. The introduction of foreign food products, of the musket, the activities of missionaries and of traders, and the white settlement of New Zealand, led to the rapid destruction of Maori culture. The neglect of the Maori, ill-usage, and the cupidity of the European, resulted in the two races facing one another in dramatic opposition in the sixties of the last century. The Maori are now increasing in numbers but there is much mixed blood and many are virtually Europeanized.

Much has been gathered and recorded concerning Maori culture and many assumptions have been made concerning their mentality. The present need is for scientific analysis and treatment of this material. Characteristics resulting from the destruction of native culture have been assumed to be intrinsic to the people. Again, the widespread assumption that the Maori are essentially 'mythopoetic' and incapable of abstraction, of scientific and the more philosophic forms of human thought is disposed of when the esoteric lore of the *Whare Wananga* (School of Learning) is examined. Lévy-Bruhl's theory of an intrinsic difference between primitive and civilized mentality and of primitive mentality as pre-logical and essentially mystical finds no support in the case of the Maori who, when their premises are known, are found to have argued as logically as the civilized thinker. Nor is there any support for the believers in race traits as the main determinants of culture. Maori culture is to be interpreted in terms of history and geography. The great differences in mind and character between the ancient Maori and the European are of social and cultural origin. The most promising mode of approach to the study of Maori mind is through the consideration of the unconscious patterning of feeling, thought and behavior in Maori society in terms of the existing culture. Study of the intricate *tapu* (taboo) system, of their form of communism and of their warlike character provide varied examples. Study of the contact of the two peoples is a study in the destruction of a culture and the consequent disintegration of mind.

T. H. Swan. *Kohlschütter's 'Depth of Sleep' Curve.*

Probably the study most commonly accepted as the earliest of modern experimentation on the subject of sleep is that of Kohlschütter. The experimental method employed has been criticized, but the results and the so-called 'depth of sleep' curve, represented as derived from the latter, have received full acceptance as published. The curve, especially, is not only to be found in many psychological and physiological texts but is also frequently referred to in the literature of research. Comparison of the curve with the data upon which it is founded reveals a serious disagreement that seems to have escaped notice for nearly seventy years.

The actual experimental observations consisted of measurements of the varying arcs through which a pendular hammer fell against a slate block and the distances from the slab to the subject's nearer ear. A journal was likewise kept of the subject's activity and of any external events of possible consequence. The assumption is that the apparatus presented a graduated series of sound-stimuli and that the thus-produced stimuli constituted a direct measure of how 'deeply asleep' the subject was at any given time. A total of 74 observations were made at irregular intervals on one subject over the course of eight nights. The 'depth of sleep' curve was said to have been constructed from these data.

When these data are subjected to any conventional treatment, such as the taking of arithmetic of geometric means or the application of Chauvenet's criterion, the results do not lend themselves to such a curve as reported by Kohlschütter. Nor is much better agreement obtained by the exclusion of such data (over 30%) as the experimenter saw fit to question. Such a curve as was given can be reproduced from the original data only by an appropriate selection of values. However, such a procedure involves the elimination of 45% of the total data.

The curve arising through the taking of the arithmetic means of the original data resembles in form other curves obtained by some other sleep investigators through similar and different experimental methods.

PERCIVAL M. SYMONDS. *Choice of Items for a Test on the Basis of Difficulty.*

This paper is concerned with the scaling of test items, and it explores the results of scaling tests steeply on the basis of difficulty, as contrasted with selecting the items so that all are of equal difficulty. The ogive relationships found by Thorndike and Ayres connecting the level of ability or achievement, on the one hand, with the percent of exercises correctly answered, on the other, is accepted as the basis for the investigation. A criterion of the appropriateness of a test item is developed such that the function, $z/\sqrt{pq}$, is a maximum, where p and q are the proportion of successes and failures in doing items of a given level of difficulty, and z is the ordinate of the normal probability curve, corresponding to the ogives which give the relation between the per cent correct and difficulty.

For testing an individual, the maximum ordinate of the curve, $z/\sqrt{pq}$, is at $x = 0$, which leads to the conclusion that the most appropriate test for measuring an individual is one in which all of the items can be answered with 50% accuracy by the individual.

In considering the most appropriate test items for measuring two or more individuals in a group, the ordinates of overlapping $z/\sqrt{pq}$ curves are compared. It is found that the best test for measuring an ordinary school class is one in which all of the items are of the same difficulty and can be answered with 50% accuracy by the average member of the group. For a test designed to measure several consecutive groups, such as several consecutive school grades or high-school classes at any time of the school year, it is best to have the items range evenly in difficulty, from those which can be answered with 50% accuracy by the average member of the lowest group in which the test is to be used, to the items which can be answered with 50% accuracy by the average member of the highest group to be tested.

The greatest progress in the development of the testing movement is seen to lie in the collection of lists of valid items with difficulty-values for each subject or function to be tested. From these lists each teacher or school system could make selections for its own tests. Such tests would be better and cheaper than standardized tests which are now commercially distributed.

H. C. Syz, see E. F. Kinder.

W. S. Taylor. *Science and Cult.*

For contrast between cult and science, it may be helpful to sketch the ideal characteristics of the pure scientist and of the pure cultist, respectively, imagining that we could find such cases.

The intellectual attitude of the pure scientist is hypothesis; the attitude of the pure cultist is conviction. The scientist is aware of the interrelations of his own with allied fields; the cultist does not see the reality or need of allied fields. The scientist again knows his subject has a history, while the cultist thinks his had a beginning.

The scientist's devotion, ideally, is to truth; the cultist's interest is to establish his own position. This means that when it comes to criticism of his views, the pure scientist is interested and open-minded, whereas the cultist would defend himself. It follows that with respect to his pupils, the scientist is a teacher; the cultist is a preacher.

Conditions favorable to cults include the simplicity and inertia of the human mind, the tendency to follow leaders and crowds, the urge of human values, needs or desires, and the lack of critical, especially experimental, check. The provinces of mechanics, physiology, general medicine, psychotherapy, politics, and religion, may represent accordingly a scale of increasing favorableness for cults.

The remedy would seem to lie in more facts, in more of the attitude of hypothesis, in more checks on our interpretations.—experimental checks especially, but when they are lacking, then we need logical checks. These are developed best in free exchange of ideas.

W. S. Taylor. *The Psychology of Personality and 'Sublimation.'*

Hume's analysis " of the amorous passion, or love betwixt the sexes " seems much nearer the truth than is the psychoanalytic conception. Hume said that " the amorous passion," " in its most natural state, is derived from . . . the pleasing sensation arising from beauty; the bodily appetite for generation; and a generous kindness or good-will." He showed, too, that these several components tend to go together and that they reinforce one another, though they may be separated. Without assuming his list of components to be psychologically perfect, Hume's outline may nevertheless lead toward some clarification of the notion of 'sublimation.'

When thwarted, the distinctive tendencies in love are actually given what expression they can be allowed, in their original quality but through different channels, or they are denied waking expression if possible. But denial, or inhibition, requires high integration, and fatigue lowers its success. It follows that securing release for as many impulses as possible makes it easier to inhibit the remainder. This is why the example of the unloved woman who turns to the convent for a life of devotion is a good example of 'sublimation': her life there holds sufficiently similar situations to relieve considerably a number of her balked dispositions. For her " regard or esteem," there are the persons of worship; her appreciation of beauty finds some satisfaction in the churchly ceremonies; and even the lustful component may find a real outlet if it can be redintegrated through religious fantasy without great conflict, as the studies of certain women mystics have shown.

Sublimation seems to reduce to a congeries of processes. These processes include: the redintegration and reconditioning of emotional components; the release of intentional or purposive attitudes through similar volitional situations; the diversion of attention to avoid the habitual irritants of any undesired impulse; the establishment of inhibitions; the enhancement of hedonic tone and with it the integration of the organism, as a result of esthetic satisfaction, social stimulation, and personal success in a new field; and the resolution of conflicts through the suggestions and insights that come from new activities and interests.

ALEXANDER D. TENDLER. *The Rôle of Intelligence and Emotion in Maladjusted Children.*

Intelligence and emotional stability are two factors that have received attention in the diagnostic studies of juvenile delinquents. The part they play in a process of adjustment may be determined by a comparison of problem children who respond well and those who respond poorly to supervision and adjustment efforts.

The present report deals with one hundred boys, the charges of a social service agency doing adjustment work with juvenile delinquents. The children ranged in age from 9 to 16; 70 per cent of the cases fell between the ages of 11 and 14; 12 per cent fell at and below 11, and 18 per cent above 14.

Ratings were given these children, by the social workers handling them, as to the degree of maladjustment they presented when first referred to the agency and that at the time the study was made. It was possible to divide the cases into two groups, 'severe' and 'mild' cases, when first referred, and into three groups on the basis of responsiveness to treatment—'good responders,' 'fair,' and 'poor.' All were given the National Intelligence Scale A and a form of the Woodworth Personal Data blank. The results of the tests were studied as to how differential they were for the groups discriminated on the basis of severity of original status and responsiveness to treatment.

Past status seems to bear a relation to present status, for the group of 'good responders' has an average past rating of 4.9, the 'fair responders' has an average past rating of 5.9, and the 'poor' group an average past rating of 7. The ratings were on a scale of 1 to 10, the latter being the most unfavorable.

Results of the intelligence test indicate that all degrees of intelligence are represented in the delinquent group, from very inferior to very superior ratings. In comparison with the normal, the delinquent group seems to be more heavily weighted at the inferior end of the curve. The median IQ of the entire group is 92.5.

With respect to past status the factor of intelligence does not seem to differentiate between severe and mild cases, for 50 per cent of the mild cases occur at or above the median IQ, and 46.5 per cent of the severe cases occur at or above that point. In responsiveness to supervision the factor of intelligence does seem to be significant; the good group has 71 per cent at or above the median IQ, and the fair and poor groups contain, respectively, 43 per cent and 47 per cent.

The factor of emotional stability presents significant findings. The median number of unfavorable responses on the Woodworth Personal Data blank is 14. The range is from 1 to 34. Comparison may be made with the results obtained by Buford Johnson, who used the same set of 60 questions with a group of under-nourished children and a group of normal children. She found that 30 per cent of the under-nourished children made a score of over 15, while only 17 per cent of the normal children went above that point. In the delinquent group here reported 15 per cent of the children scored above 15.

The factor of emotional stability seems to make a difference both in severity of past status and in responsiveness to treatment; 46 per cent of the mild group fell at or above 14, the median number of unfavorable responses, while 67 per cent of the severe group fell at that point. The group of 'good responders' had 32 per cent above that point, the 'fair responders' 61 per cent, and the 'poor responders' 70 per cent.

It may be concluded that varying degrees of maladjustment may occur at any intelligence level, and that unfavorable emotional responsiveness tends to produce the more severe degrees of maladjustment. For the process of adjustment both good intelligence and emotional stability are essential.

Dorothy Swaine Thomas. *New Techniques for Studying the Social Behavior of the Young Child.*

New techniques are being developed for studying social behavior. The laboratories used at present are the usual nursery school playrooms. The techniques have the following common features: (1) they are applied to children in group situations; (2) they attempt to measure, in rigidly defined behavior-units, the proportion of overt behavior directed towards or associated with other persons as compared with the proportion directed towards materials and towards the self; (3) they utilize human observers as the instrument of measurement, and their methodological problem centers in the control of the observer.

No attempt is made to set up 'controlled' experiments, for, it is claimed, most of the stimuli leading to social behavior cannot, at the present stage, be recognized or isolated. This difficulty is not considered a barrier to the study of social behavior—the problem is shifted to that of noting and recording the selective responses, in terms of certain overt behavior-acts, recurring in the individual and the group when surrounded by a multiplicity of social and material stimuli.

At the present stage of development the methodological problem is foremost. From case records and group-personality studies relatively simple recurring acts are selected for further investigation on the basis of their apparent significance in the total social-behavior pattern. These are reduced to overt behavior terms, and units of measurement are invented. Observations are made simultaneously by two or more observers. Their reliability depends on the concurrence of observers (trained in record-making but not indoctrinated), and on the agreement of observations with some other form of record where this is possible (dictaphone records, *etc.*)

The significance of any technique depends not only on its reliability, but on its ability to differentiate among individuals who are otherwise differentiated in social responses (*i.e.* correlation of data obtained by a given technique with data obtained by other techniques), and to measure trends in social development.

H. Thompson, see A. Gesell.

Edward L. Thorndike. *The Need of Fundamental Analysis of Methods of Teaching.*

Changes in methods of teaching are due to the insights and experiments of persons actually engaged in teaching and of students of the science of education, including educational psychology. Changes proposed and adopted have included mistakes and excesses. These should be reduced by better analyses of just what will happen when the method is used in schools—when the learner is provided with such and such situations or stimuli and led by such and such means to respond in such and such ways. Illustrations of the value of greater acuity, detail, and completeness in the psychological analysis of methods of teaching are reported in the case of arithmetic, grammar, and spelling.

Edward L. Thorndike. *Units of Measurement.*

It is desirable that the numbers which are, or are derived from, the scores in a mental test or measurement should, if possible, possess these four qualities. First, they should represent increasing amounts of the same thing or quality or attribute or power. Ten should be the same stuff as nine, but more of it. Second, the difference between 9 and 10, 14 and 15, 25 and 26, *etc.*, should be in some intelligible sense equal. Third, the zero of the series should be in some intelligible sense approximately just not any of the thing or quality or attribute in question. Fourth, any one of the series of numbers should be a measure of the thing or quality in its entirety and uncontaminated by aught else. It should measure all of it and nothing but it.

It is important that we choose wisely the mental things or qualities whose quantitative variations we seek to express. It is not sufficient to follow customary usage and try to measure musical ability, honesty, courage, mathematical ability, ability to make money, and the like. To do this is useful for many purposes and indispensable for some, but it is not sufficient. We may wisely be on the lookout for scales and units which would be applicable to the primates as well as man, and even to mammals in general. We may also wisely investigate the relations of mental abilities or traits which we measure to sensory and motor and other systems of the body. We may also wisely study the action of these abilities or traits in inheritance.

EDWARD L. THORNDIKE. *Fundamental Factors in Learning.*

We should consider such simple but fundamental questions as these. What does the repetition of a stimulus or situation do? What does the repetition of a sequence do? What does the intensity or vigor of a process do? What do rewards and punishment do?

The mere repetition of a stimulus in and of itself is unproductive for learning. The most frequent response to it does not wax at the expense of the less frequent responses. The mere repetition of a sequence in which the second member does not belong with, or is not a response to, the first member produces very little or no learning. Connection in time is a condition permitting other forces to act rather than a force in itself. Even when the second member does belong with the first, the repetition of the connection without any resulting satisfaction produces learning rather slowly. Motivation in the form of rewards and punishments is the most important force in selecting connections for survivals. Punishments, *i.e.* annoying or painful consequences, do not weaken the connection to which they are attached but only strengthen some other connection. Their effect upon learning is not fully comparable to that of satisfying consequences. It is more specific, more variable, and less direct. Psychologically punishment is not the true negative of reward.

EDWARD L. THORNDIKE. *The Strengthening and Weakening of Mental Connections by Their After-Effects.*

This paper reports the results of experiments in which certain mental connections are strengthened or weakened by satisfying or annoying after-effects, always in the form of the announcement of "Right" or "Wrong" to the subject by the experimenter. The experiments are so devised as to be nearly or quite crucial as between the hypothesis of a direct and immediate action of the satisfyingness or annoyingness of the after-effect upon the connection, on the one hand, and, on the other, the various hypotheses of Hobhouse, Watson, Carr, Woodworth, Tolman, Peterson, Hollingworth, and others, which assume that frequency, recency, congruity, facilitation of a consummatory response, or of some other form of activity, or the rehearsal or revival in memory of the right response or of its after-effect, is the causal factor.

For example, the subject learns to choose the right one from five words in a multiple choice test. His choices are always made by underlining one of the five words. The right word is placed toward the right end of the line much oftener than toward the left end. Of this the subject knows nothing. Yet he acquires, as the experiment progresses, a tendency to underline at the right end erroneously or irrelevantly more than frequency would give. Here there is no congruity whatsoever. Also a wrong or annoying response facilitates consummation or freedom for further activity or completeness as much as a right response in every sense except that it is not as satisfying. It ends the cycle in exactly the same way and with equal completeness. Lastly, there can be no question of rehearsal or revival of ideas to the effect that it is desirable to underline at the right, since the subject has no knowledge or suspicion that such is the case.

ROBERT H. THOULESS. *Scientific Method in the Psychology of Religion.*

Although admirable and important statistical and experimental work has been done in the psychology of religion, this department of applied psychology has, on the whole, been relatively slow in passing from the stage of random observation to that of reliance on a satisfactory scientific technique.

Psychological methods which have so far been used are (1) controlled introspection experiments (Girgensohn), (2) statistical enquiries (Starbuck, Leuba, Girgensohn, and others), (3) the use of the mental test technique (Starbuck), and (4) the experimental production of religious mental conditions (Leuba and others).

For further development of experimental methods in the psychology of religion, we must probably wait for developments in the laboratory technique of psychology itself. In two special directions we may look for help: (a) to the future development of satisfactory objective methods of recording and differentiating emotional processes; and (b) to the development of reliable tests of temperamental traits.

When these laboratory developments have taken place, we may reasonably hope to be able to place on a scientific basis the investigation of the affective processes of the ordinary (*i.e.* non-mystical) religious life and the classification of religious types.

ROBERT H. THOULESS. *The Identity of the Absolute and Differential Thesholds.*

The fundamental mathematical fallacy of Fechner's deduction of Fechner's Law from Weber's Law and the convention of the equality of just noticeable sensation increments arises from his acceptance of two postulates which are inconsistent with one another. These are (a) that Weber's law is true over the whole range of stimulus intensities down to zero, and (b) that there is an absolute threshold below which the next perceptibly different stimulus is zero. Both of these postulates cannot be true, and by assuming the truth of both Fechner was led into the absurdities of assigning negative values to the sensations from stimuli below the absolute threshold value.

If we are right in supposing that the absolute threshold is simply a special case of the differential threshold in which the background stimulus has a zero value, then, if absolute and differential thresholds are measured under identical conditions, we should find that the ratio δ S/S (where S is any stimulus intensity and δ S is the amount by which it must be reduced to give a stepwise phenomenal configuration) varies continuously from 1 when S is at the absolute threshold value, to the fractional value indicated by Weber's law at some greater value of S.

Experiments carried out by Dr. J. H. Kenneth at the Glasgow Psychological Laboratory indicate that this is the case. Continuous sound stimuli from an oscillating valve were administered to a subject with sharp drops in intensity of varying amount and the subject was asked to report as soon as he had the experience of a step phenomenon. Determinations of δ S/S were made from the value at which S — δ S was zero (the absolute threshold) up to a medium intensity of sound. The value of δ S/S was found (within the limits of observational error) to lie on a continuous curve falling from the initial value of 1.

ROBERT H. THOULESS. *Magnitude of the Psychogalvanic Reflex Phenomenon in Alternating Current Circuits and with Direct Current of High E.M.F.*

Professor Gildemeister has stated[1] that the psychogalvanic reflex does not occur in alternating current circuits. By using a more sensitive circuit, it has been found possible to obtain (and to record photographically) the psychogalvanic response to a sound stimulus when an alternating current of not too high frequency (obtained from an oscillating valve) was passed between two electrodes on the hand. The magnitude of the phenomenon was, however, reduced. At a frequency of 640 v./s. the percentage change in apparent resistance was 1/5th of that in direct current; at 2,700 v./s. it was about 1/20th, and at 5,000 v./s. it was too small to be measured.

These results are in complete agreement with Gildemeister's contention that the psychogalvanic reflex is a phenomenon of reduced polarization. They are, however, also consistent with Professor Einthoven's theory[2] that the small value of the apparent resistance of the body to alternating currents is due to the skin's acting as the imperfectly insulating dielectric of a condenser, if we assume that it is the resistance of the skin and not of the underlying tissues that is changed in the psychogalvanic reflex.

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[1] M. Gildemeister, Der sogenannte psychogalvanische Reflex und seine physikalisch-chemische Deutung, *Arch. f. d. ges. Physiol.*, 162.

In order to decide between these two possibilities, the apparent resistance of the body and the magnitude of the reflex were determined with direct currents of high e.m.f. On the polarization theory, the reflex (measured as per cent change in apparent resistance) should be less at high potentials, while on the skin-resistance theory it should be unchanged. In fact, it was found that the reflex became progressively less as the external e.m.f. was increased, although at 40 volts it was still as much as half of the value at 2 volts.

Observation of the apparent resistance of the body at high potentials shows that polarization goes on increasing to high values. Use of Oberbeck's formula,[3] $p = P.\, i/(i + x)$, indicates that a 43.5 external voltage between two electrodes on the palm causes a back e.m.f. of polarization of about 17 volts, and that P (maximum possible polarization) is about 33 volts. If these are correct values for polarization, the variations in the psychogalvanic reflex with different external e.m.f.'s are explained if the reflex is a change in polarizability of the skin, since the percentage change in conductivity is found for all values of external e.m.f. to be approximately proportional to $P - p$.

L. L. Thurstone. *Functions* vs. *Correlations.*

The object of any science is to discover the laws that underlie the phenomena that it is studying. In so far as psychology is a science its principal object is also to formulate laws. As the laws in any science are refined they tend to become quantitative.

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[2] W. Einthoven and J. Bijtel, Über Stromleitung durch den menschlichen Körper, *ibid.*, 198.

[3] A. Oberbeck, Zur Theorie der galvanischen Polarisation, *Annalen der Physik und Chemie,* n.f. 63, 1897.

This has been the history of older sciences and the tendency is increasingly apparent in the biological sciences. It is probable that psychological laws will have the same history.

At the present time refined quantitative methods in psychology are found primarily in the field of mental tests and psychophysics. Much more attention is now being given to mental tests and related subjects than to psychophysics in the traditional sense. The quantitative work in mental tests is of a correlational sort, while psychophysics deals primarily with theoretical functions and their experimental verification. Examples of these functions are Fechner's law, Weber's law, and the many functions in the refined physical and physiological investigations in vision and hearing.

The quantitative methods that have been developed in mental tests and related subjects are almost exclusively statistical. The Pearsonian correlational methods have permeated quantitative work in psychology, so that not infrequently the Pearson correlation coefficient is regarded as the final verdict about the relation between two variables. In fact, correlational procedures are so much the habit that they are frequently used when more refined quantitative analyses are indicated by the problem.

It is the writer's contention that the development of quantitative analyses in psychology is actually being hindered by the great emphasis on statistical and especially correlational logic. Our ultimate hope in dealing with any problem that can be quantified should be to arrive at a quantitative rationale so that the relation between two or more variables may be stated as a rational equation. The correctness of the rational equation can be verified by experiment. Merely to calculate correlation coefficients with their numerous appurtenances, such as indices of non-linearity, skewness, probable errors, and the like, constitutes only a first rough approximation to the quantitative description of a relation. If an investigator keeps his mind exclusively on correlational analyses between variables, he will forget the far more fundamental and important task before him, namely, to invent a quantitative rationale which leads to a rational equation.

The difference can be illustrated with Fechner's law, which is one of the very few laws that we have in psychology. The statistician would investigate the relation between S and R by calculating a correlation coefficient between these two variables. He would calculate the correlation ratios and discover that the relation is non-linear. One or both of his distributions might be skewed. The correlation ratios would have a small probable error. But in all of this work we have not even begun to formulate a clean scientific law. If the investigator should plot S against R and discover that all such diagrams satisfy a simple logarithmic equation, he would be dealing with a function, in this case Fechner's law.

Statistical procedures should be regarded as crude attempts at quantification when the investigator has no idea about any underlying rationale. Correlational procedures are make-shifts. Our object is to discover the functions that describe relations between the variables that we are studying. If we have no idea what the relations are, we are justified in resorting to correlation coefficients as a temporary make-shift. They serve a very useful purpose but it is well to realize that our object is to develop quantitative analyses beyond the mere correlational stage so that psychological phenomena may be described as far as possible in terms of rational and empirical equations. Whenever a quantitative rationale is discovered for any kind of phenomenon the correlational procedures in that field have outlived their usefulness. Correlational procedures should be used with an apology for our ignorance. They should be regarded as the crude beginning only, in the reduction of chaos to quantification.

L. L. THURSTONE. *Units of Measurement.*

One of the central problems in mental measurement concerns the units in terms of which mental phenomena are described. A unit of measurement is always an operation or process which can be repeated in different parts of the continuum along which measurement is to be made. Many numerical descriptions of psychological facts fail to satisfy this fundamental requirement of true measurement. For example, the raw score in a psychological test does not constitute a true measurement of ability even though it constitutes a true measurement of the number of questions correctly answered. Another example is that of mental age, which no one believes to be a true measurement because no one believes that the mental development between the ages of one and two years is in any genuine sense equal to the mental development between the ages of twelve and thirteen.

In the construction of various scales the standard deviation of test intelligence of a random sample of children has been used as a unit of measurement. This unit of measurement has been shown to be valid except for the fact that some scales have been constructed on the assumption that the dispersion of test intelligence is constant for all ages. It has been found that the variability of test intelligence increases with age.

In the construction of so-called 'judgment scales' the Fullerton-Cattell theorem has until recently been assumed to be correct. According to this theorem equally often noticed differences are psychologically equal. It has been found that this unit of measurement is valid if the ambiguities of the stimuli or specimens can be assumed to be constant. The theorem with its unit of measurement becomes correspondingly unsafe for stimuli or specimens whose ambiguities cannot be assumed to be constant.

In an effort to find a truly psychological unit, as distinguished from the j.n.d., which is a physical unit, the writer has adopted the discriminal error, which is the standard deviation of the dispersion that any stimulus, selected to be a standard, projects on the subjective continuum. It has been shown that the discriminal error is a form of psychological unit which can be used for measurement of the subjective displacements between stimuli or specimens for any quality which lends itself to comparisons in the form of 'more' or 'less.' This unit has been used not only for psychophysical measurement but also for the measurement of affective values of stimuli and for the measurement of social attitudes and prejudices.

L. L. Thurstone. *A Rational Equation for the Learning Equation.*

It is assumed that the number of acts initiated by the learner per unit time is constant, that some of these acts are lost in confusion or inhibition before they are overtly expressed, that some of them become overtly expressed as errors, and that a certain proportion issue as successful acts. It is assumed that the probability of repeating an act is increased if it is a success and that this probability is decreased if it is an error. The learning constant, k, expresses the extent to which the subject profits by his experience. These assumptions lead to the following equation for rote learning,

$$\frac{2\,p-1}{\sqrt{p-p^2}} = \frac{k}{\sqrt{m}}\,t + \frac{2\,p_0-1}{\sqrt{p_0-p_0^2}}$$

in which $p =$ proportion of successful acts per unit time, $m = n^3$ is the complexity of the task, n is the number of items in the list, p_0 is the proficiency at the start of learning, and t is practice time. This equation leads to a number of hypotheses, some of which are as follows. A homogeneous learning task (elements of equal complexity) gives a symmetrical S-shaped learning curve which satisfies the above equation. Its inflection point is at $p = 0.5$. A heterogeneous task (elements of unequal complexity) gives a non-symmetrical curve with inflection point in the lower half of the curve. Waning of the subject's interest or failure to spread attention equally over the entire task also depresses the inflection point. The learning time varies approximately as the 3/2 power of the length of the task according to the following equation:

$$T = \frac{c}{k}\,n\,\sqrt{n-a},$$

in which c is a constant depending on complexity of the task and degree of perfection required, and a is the attention span of the subject.

The number of repetitions varies approximately as the square root of the number of items in the list according to the following equation:

$$R = \frac{c}{k} \sqrt{n - a}$$

A heterogeneous task which is composed of two principal levels of difficulty gives a plateau in which the slope of the first part is steeper than the slope of the second part.

Some of the above hypotheses have been verified on published data by Ebbinghaus, Lyons, and others.

J. W. TILTON, see D. C. KNOWLTON.

O. L. TINKLEPAUGH. *The Multiple Delayed Reaction with Chimpanzees and Monkeys.*

In a simple delayed reaction situation a pair of similar containers is arranged before the subject and, with him looking on, lure is placed under one of them. After an interval of delay the subject is permitted to return and to make one choice from the containers, taking the lure if he chooses correctly. In the present investigation the situations were multiplied and arranged so that the subjects had to remember the locations of the lures in a series of situations in order to choose correctly.

With a pair of containers in each of several different rooms, the subjects were led from room to room to see the lures placed and then were permitted to return to the rooms, either serially or in broken order, to make their choices. The average results for the different subjects were as follows:

Two chimpanzees: 10 pairs in 10 rooms, 88 and 92 per cent correct.

Three monkeys: 5 pairs in 5 rooms, 66, 78, and 80 per cent correct.

Pairs of containers were similarly arranged in a circle in one room and the subjects saw the lures placed serially and then made their choices either serially or in broken order. The percentages of correct choices were:

Two chimpanzees: 8 pairs, 87 and 90 per cent; 12 pairs, 81 and 84 per cent; 16 pairs, 77 and 76 per cent.

Two monkeys: 4 pairs, 64 and 82 per cent; 6 pairs, 53 and 77 per cent; 8 pairs or more, 'chance.'

EDWARD CHACE TOLMAN. *Maze-Performance as a Function of Motivation and of Reward as well as of Knowledge of the Maze-Paths.*

The classical account of maze performance is too simple. It conceives the rat as responding to a mere series of moment-to-moment stimuli. It is not adequate to care for the results of experiments in which motivation and reward are themselves varied.

The experiments of Simmons, Szymanski, Hamilton, Washburn, Tolman and Robinson and Honzik, Blodgett, Tolman and Honzik, Bruce, Elliott, and Williams, in which the effects of controlled differences of, or variations in, motivation and reward have been investigated, demand some other type of formula.

M. H. Elliott has suggested such a formula. He proposes that *maze-performance,* as the dependent variable, may be conceived as a function of the three independent variables: (1) *knowledge of the maze-paths;* (2) *motivation;* and (3) *the actual type of goal-object provided at the exit to the maze.*

In the experiments cited it is primarily changes in (2) and (3) which are investigated. And it appears further, as Elliott points out, that the results of these experiments indicate that a fourth intermediate variable, depending for its own value, on any given occasion, upon the specific values of (2) and (3) and upon certain subsidiary conditions, is to be conceived. This fourth variable is to be designated:

(4) *The actual reward-value of the provided goal-object.* It is this *reward-value* which, together with the *knowledge of the maze-paths,* constitutes the immediate determiner of *maze-performance.*

Finally, as the determiners of (4) itself, the following conditions, arising out of combinations of (2) and (3) together with various subsidiary factors, appear to be operative: (a) the actual physiological appropriateness of the provided goal-object, given the motivation; (b) a seeming appropriateness in this goal-object, given this motivation and given certain specific past experiences of the rat; (c) the degree to which the provided goal-object is the one expected; and (d) the degree to which this goal-object may happen to be a substitute for some other previously provided goal-object. The influence of each of these conditions is indicated in the experiments cited.

One last word. I am aware that the introduction of such anthropomorphic concepts is offensive. I apologize. And, further, I am willing to hope that perhaps some day they may be abandoned in favor of very detailed lists of underlying stimulus-response bonds or in favor of some picture of underlying configurational stresses, strains, and tensions—working themselves out according to the laws of closure, *Prägnanz,* and the rest. For the present, however, I, for my part, must declare that, *when it comes to rats,* neither the system of Thorndikian bonds nor that of 'Gestaltian' configuration seems to me as yet sufficiently detailed or sufficiently specific to be as fruitful for further research as are the above anthropomorphisms.

A. TOLTCHINSKY. *The Practice of Psychomotor Functions.*

1. Each group of subjects examined (20 in number), during a period from 1½ to 3 months daily, practiced (1) the speed of a simple auditive reaction, or (2) the steadiness and agility of the movements of the hand (O_6 and S_3 tremometer), or (3) the coördination of the right and left hand (tracing a circle on a support, raising and lowering of two metallic needles; apparatus of Glasof-Tolchinsky), or (4) the visual-motor and motor accuracy and precision of aim in hitting an immovable target, or (5) the normal and maximal rate and 'pointillage.'[1]

2. As the investigator has shown, there are psychomotor functions which can be learned to a greater or less degree and others which cannot. Some functions which cannot be learned (*e.g.*

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[1] In this experiment Z. Barabanos, I. Glasof, N. Goussef, N. Zelenef have taken part.

those which are practiced on the apparatus of Glasof-Tolchinsky) show no improvement, either in the speed or in the precision of movements, in spite of daily practice during the initial very short period.

3. The curves of learning of each function are typical for it, though a weak tendency towards the maintenance of the individual type is also noticeable.

4. The general statement concerning a greater capacity for the practice of the more complicated functions has not been confirmed by experiment. Thus, for example, the agility of movements (53 on the tremometer) is less capable of improvement than the steadiness of the hands, though the first is more complicated and the coördination of the movement of the hands (according to the test of Tolchinsky-Glasof) appears unchangeable by practice.

5. In the preliminary period of the practice the psychomotor functions are influenced by previous work, attention, fatigue, the forms of breathing, and so on. Later an increasing steadiness is observed.

6. The law of co-exercise of the functions and of separate organs has been confirmed by experience; thus the practice of the right hand influences the success of the work of the left hand, and *vice versa;* the practice for steadiness influences the agility of movements; *etc.*

7. The general statement relative to the inverted relation between the constancy of the test and the capacity of learning is not confirmed by experiment. Thus the test for the coördination of the hands (support) gives constant results and at the same time the function tested is markedly capable of improvement.

8. The comparison of the individual curves of growth of progress gives curves diverging, parallel, crossing, and converging in one point. The extreme ranks of the subjects assert a tendency towards constancy.

9. The comparison of the curves of learning show only divergent and parallel curves. The conspicuous exceptions to this rule, noticed in the last period of practice, find an explanation in the decrease in interest in the work of some subjects.

HERBERT A. TOOPS. *A 'Generalized' Statistics.*

Because of the nine methods of obtaining moments (ΣX, ΣX^2, ΣXY, *etc.*) and of the three concepts as to the face-value of a test score, twenty-seven different consistent kinds of statistical textbooks are possible, each of which in turn may be written from the viewpoint of some four or five types of potential consumers. This chaotic condition—already partially attained—may be avoided by a simple transmutation equation which this paper illustrates.

HERBERT A. TOOPS. *The Need for Organization in the Attack on the Analysis of Mental Structure.*

The final test of the correctness of all laws and principles is prediction and control. So long as our validity coefficients hang relatively stationary on the short side of 0.70, in spite of much scaling, location of zero-points, selection of tests and items, and heirarchies, it follows that new hypotheses need to be investigated and new lines of attack to be undertaken: the modes of combination of traits in social behaviors, the measurement of unmeasured traits, the life-time practice of the individual, the experimental analysis of practice, maturity and 'forgetting,' and the limitations of motivation. We have been hoping for too much from a single snapshot of a few trees of the forest. All considerations argue for coöperative interdepartmental research on a common group of subjects by all the scientists who deal with human structure and function. The returns from such research may be expected to vary as the square of the number of research workers involved, whereas present results, by individual and isolated research, are proportional to their number.

HERBERT A. TOOPS. *Empirical Psychology and the 'Generalized' Regression Equation.*

Empirical psychology postulates the general principles of the physical sciences, and claims that a sufficient understanding of behavior is attained when such behavior can be practically controlled through altering the elements entering into the situation.

Control assumes prediction. The discovery of the generalized regression equation for the first time permits the claims of empirical psychology to be seriously considered.

The 'generalized' regression equation is not limited, as is the ordinary linear regression equation, to relationships which plot on paper as nomographic families of parallel straight lines but permits of relationships in which the nomographic family (to which these may always be resolved) consists of straight lines converging to a point, of parabolas or higher degree curves, of growth curves, and the like.

It is asserted that the simplest of these is the minimally acceptable relationship for expressing the covariance of related traits in the production of observed proficiency. They enable one to observe the joint effect of two, three, or more factors, such as speed, quality, and capacity, in the production of product without the usual limitations of 'constant weights,' as they, in effect, permit the weight of a variable to be a function of the magnitude of the variable itself. Inasmuch as such equations degenerate into the usual regression equation, when the relationship requires such, the minimal value of the validity coefficients so obtained is the ordinary multiple correlation coefficient. A people geometrically primitive but well developed in algebra, equipped with this equation, would be able experimentally, and without logical insight, to discover many of the simpler equations of physics and mensuration.

LAURA CHASSELL TOOPS. *Quantitative Differences between Highly Successful and Moderately Successful Educational Leaders.*

The studies of quantitative differences between highly successful and moderately successful educational leaders are related to the writer's earlier studies of qualities associated with success in educational leadership.[1]

The research as a whole is based on the data which were available in an institution for the training of educational leaders. It pertains to all persons who had received the degree of Doctor of Philosophy through a period of some fifteen years, and includes 107 persons. In the present group of studies, data available for the most successful fifteen per cent and the least successful fifteen per cent, are tabulated analytically from a variety of standpoints in an effort to discover differences between the two groups which are sufficiently marked to indicate traits suggestive of success in educational leadership. The criterion of educational success used for the assignment of the success scores, on the basis of which these groups were selected, was a composite of the ratings of the entire group by members of the staff with respect to the traits, *success as scholar-investigator-author* and *success as teacher-supervisor-administrator.*

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[1] Cf. *Psychol. Bull.*, 19, 1922, 107.

The data which are handled are principally those available from the files of the appointment committee. The studies include analyses (1) of the facts regarding the personal history, particularly in the academic and the professional aspects, (2) of the filed letters of recommendation, correspondence, and miscellaneous material, and (3) of evidences of inaccuracies and peculiarities.

The tabulation-forms prepared for the first group of studies suggest some refinements in personal-history blanks in use by bureaus handling candidates for important positions in education. A classification of correspondence and miscellaneous material has developed in connection with the second group of studies which is believed to have some value for general use by appointment committees and other teachers agencies. The analyses of the third group of studies, indicating a frequent failure on the part of educational leaders to achieve emotional maturity, show one direction which personality studies may take.

LAURA CHASSELL TOOPS. *Experiment in the Control of the Eliminative Functions.*

The experiment in the control of the eliminative functions was begun at the time the infant studied was about three months old and continued for 18 months, covering a period of about 550 consecutive days. The data represent all care and training given to the eliminative functions during the twenty-four hours of each day in this period, and comprise more than six thousand observations. They show learning under home conditions. For the first three months these were unusually favorable, resembling those which might be secured in a laboratory. For the remainder of the time the conditions were variable: intervals of limited care of the eliminative functions and virtually no training alternated with intervals when opportunity for response under control was provided with relative regularity. Learning progressed from spontaneous elimination associated with elimination upon artificial stimulation, through perfect response to the controlled presentation of an eliminative situation associated with no apparent learning with respect to retention, to perfect adult control of the eliminative functions.

The report of the experiment includes a description of the general technique employed in effecting eliminative response under control; the presentation of the record-form on which were indicated facts regarding spontaneous and controlled elimination, and instructions for its use; the statement of simple mathematical formulae in terms of which to express efficiency in eliminative control and correlative learning; and the presentation of curves as follows: (1) a curve of general efficiency in the control of each of the eliminative functions through 550 days, (2) a learning curve showing the conditioning of each of the eliminative reflexes, and (3) a curve showing the time cost of all care and training of the eliminative functions through 100 days while learning was in its early stages.

A toilet suitable for use from birth through three years has been designed and application for patent has been made. As projected the toilet will be built on the basis of practical measurements, will be adaptable to a child's growth, size, and sex, will promote good posture and independence, and will facilitate training and reduce the time cost of care of the eliminative functions.

Recommendations are being developed for the guidance of mothers in the training of children, based in part upon practical experience and in part upon facts to be found in medical, physiological, and psychological literature regarding the elimination and the eliminative organs of normal infants and young children.

L. C. Toops, see also C. C. Cooper.

M. R. Trabue. *Is the Ratio of Nature to Nurture a Constant?*

Certain assumptions have appeared regularly in discussions of intelligence and have not been seriously challenged: (1) that the ability of a child to solve mental problems increases with age and experience; (2) that power to learn the usual school assignments is closely related to, and probably dependent to a considerable extent upon, intelligence; and (3) that the mental achievement of a given individual at any given age is limited by the degree of intelligence he possesses.

Discussions of the exact nature of intelligence have usually had only theoretical value. Whether intelligence is a single character or a compound of many characteristics has been an interesting problem, but its chief significance lies in its implications for those who are studying problems of heredity. There is a fair degree of agreement that, whether intelligence is a unitary character or not, it actually operates in any given individual more fruitfully with some materials than with others. One person may exhibit intelligence in dealing with plants, another with animals, another with people in politics, another with machinery and still others with abstract symbols, religious ideas or some other data. We have available certain facts regarding the relative frequencies with which intelligence actually reveals itself working with these various materials, but we do not have sufficient evidence that intellectual power to handle one type of materials is in any sense superior to or inclusive of that required to deal successfully with other types.

By far the most important practical question is: " Can intelligence be improved by education? " or, in its most practical form, " To what extent can intelligence be handicapped by lack of educational opportunities? " A point of view is proposed in this paper and evidence is submitted for use in solving this problem. While most writers are willing to agree that both environment and native intelligence enter into the production of any given mental accomplishment, those discussing the problem have too often been partisans who wished to defend their views by the establishment of a fixed ratio. Too little attention has been given to the probability that the ratio of nature to nurture increase as the amount of nurture becomes greater and more adequate. Evidence is presented which indicates that the ratio of educational influences to native capacities becomes less as the educational opportunities become greater. Education is necessary for the full development of intellectual powers, but education can hardly hope to overcome native intellectual deficiencies.

LEE EDWARD TRAVIS. *The Relation of Voluntary Movement to Tremors.*

Tremors of a rate of 8 to 12 per second may be shown to occur in normal persons in any part of the body which is being maintained by voluntary effort in any given position. The problem was to determine the relation of a sudden movement of a part, *e.g.* a hand or a finger, to the tremors. The types of voluntary movement studied are as follows: (1) sudden depression of the right forefinger; (2) sudden depression of the left forefinger; (3) sudden elevation of the right fore-finger; (4) sudden elevation of the left forefinger; (5) sudden simultaneous depression of the right and the left forefinger; and (6) sudden simultaneous elevation of the right and the left forefinger.

All of the movements were made under two conditions: (1) the subject moved the finger when he chose; and (2) he moved it only on command from the experimenter.

Records from fifteen normal male subjects revealed three main types of relationship between a voluntary movement and the tremors, as follows: (1) the voluntary movement fits into the tremor rhythm in being a continuation of either the downward or the upward phase of a tremor; (2) the voluntary movement may interrupt the tremors; and (3) the voluntary movement appears to produce anticipatory changes which interfere with the tremors in various ways. It is significant that in about 75% of the instances a voluntary movement is the continuation of a tremor and does not interrupt the tremor rhythm.

A study of three cases of lesion in the pyramidal tract revealed the fact that a loss of tremors of the affected side is roughly proportional to the completeness of the paralysis. This result confirms the opinion of physiologists that the tremors are of cortical origin. Thus the results from normals may be interpreted to mean that the cortical arcs function in a rhythmical way and that when they shift from one activity to another, they do so in harmony with this rhythm. The importance of this viewpoint is seen in connection with such problems as reaction time and rate of tapping. Reaction time in the majority of instances depends upon the temporal relation of the stimulus to the tremor rhythm. The rate of tapping is limited by the refractory phase of the cortical arcs involved. This refractory phase limits the maximum tapping rate to about 12 taps per second.

Lee Edward Travis. *The Complexity of the Patellar and the Achilles Reflex Arcs.*

The concept that the patellar and the Achilles reflex arcs are not of a lower spinal order is becoming more and more widely accepted. Of special interest in this connection is the work of F. A. Hoffmann who found that both anatomical destructions and physiological changes of the higher nerve centers alter reflex time in human subjects. It is noteworthy that he reports much greater changes in reflex time as due to physiological than to anatomical alterations.

The present paper is a report of a series of studies on human subjects which support the hypothesis that the higher neurological levels are a functional, if not an anatomical, part of the patellar and Achilles tendon reflex-arcs. These studies were made by the electromyographic method which employed an oscillograph for recording. In the first study patellar records were obtained on 122, and Achilles records on 119 normal adults. The times of both reflexes regularly correlate more highly with height than with measures that should more closely approximate the true lengths of the arcs. These facts suggest that the nerve impulse may travel beyond the cord to certain higher brain centers.

In another study of five normal adults it was found that, as stupor, due to alcoholic intoxication, advanced, the patellar reflex time progressively and irregularly decreased, and that, as the stupor cleared up, the reflex time progressively and irregularly increased.

In a third study it was found that retardation of the higher centers as clinically exhibited in marked catalepsy, and facilitation of the higher centers as clinically advertised in mania, respectively decreased and increased the patellar tendon reflex time, and that the reflex time of the affected side in hemiplegia was shorter than that of the unaffected side.

A fourth study showed that severe tonic blocks during stuttering reduced the patellar reflex time, whereas free speech had no appreciable affect upon it.

The first study indicates that the higher levels are an anatomical part and the other studies that the higher centers are at least a functional part of the reflex arcs.

Loh Seng Tsai. *The Effect of Castration upon Problem-Box and Maze Performances by the White Rat.*

Twenty-seven male rats were used in this experiment. They were of approximately the same age and body weight. All of them had learned maze 'A' in an earlier experiment. Operation was performed at the age of about five months. Twelve rats had both of their testicles removed (total castration), eight had one testicle removed (semi-castration), while the remaining seven were put through a similar operation without being castrated (operation control). Preliminary feeding was given daily for one week. Six of the totally castrated rats and the seven control animals were fed as usual in the morning, while the other six totally castrated and the eight semi-castrated ones were left for the afternoon. Each animal was confronted with the problem-

box situation once daily for four weeks. Bread and milk was used as the incentive. Time was taken with a stop-watch. The animals were then fed at the food-box of maze 'B' for one week and trained in the maze once daily during the next fortnight. Errors, retracings and times were recorded.

The results justify the conclusion that totally castrated rats are much inferior to either the control animals or the semi-castrated ones in problem-box and maze performances. The question as to whether the difference is due to the direct effect of gonadal secretion upon the nervous system or to the change of metabolism as measured by body-weight, respiratory quotient, nitrogen in the urine, *etc.*, must be left for further investigation.

OTTO TUMLIRZ. *Die Theorie der Reifejahre.*

Die Jugendkunde ist als Zweig der allgemeinen Psychologie von den Fortschritten dieser Wissenschaft bis zu einem gewissen Grade abhängig. Daher kommen in der theoretischen Auffassung der Reifungserscheinungen die verschiedenen Strömungen zur Geltung, welche in den beiden letzten Jahrzehnten die allgemeine Seelenkunde beherrschten. Die Bestrebungen der jüngsten Zeit, über Zersplitterungen und Gegensätzlichkeiten hinaus zu einer inneren Einheit der Psychologie zu gelangen, gestatten auch eine Zusammenschau und Vereinheitlichung der jugendpsychologischen Theoriebildung.

Das seelische Erleben ist einerseits von unter- und unbewussten Trieben abhängig, anderseits durch objektive Werte bestimmt. Form und Inhalt des Erlebens sind je nach der personalen und charakterologischen Eigenart des Einzelwesens verschieden. Jede Persönlichkeit bildet gleichsam einen Knotenpunkt, in dem die Urgründe des Lebens (Triebwelt) und die Idealitäten des Geistes (Wertwelt) zu einer Einheit verschmelzen. Bei der erwachsenen Persönlichkeit sind Art und Grad der Verschmelzung festgelegt. Bei der jugendlichen Persönlichkeit fehlt aber diese Bestimmtheit noch, da Individualität und Charakter erst im Werden begriffen sind, da die unreife Seele die bereits einwirkenden Triebe und Werte noch nicht zu einer erlebbaren Einheit verschmelzen kann. Für den jungen Menschen zerreisst daher die Welt in zwei Teile, in Trieb- und Wertwelt. Das triebgebundene und das wertstrebende Ich bekämpfen einander, ohne dass der Jugendliche imstande wäre, die Dualität des Lebens in sich zu versöhnen. Hier setzt das Walten der Phantasie ein, die fur die Seelenformung des Reifenden die grösste Bedeutung hat. Im Phantasieerleben versucht der Jugendliche mögliche Wege zur Versöhnung der grossen Gegensätze, sucht er den Weg zu sich selbst, zur Erkenntnis der eigenen Triebgebundenheit und Wertgerichtetheit, zu den Grenzen der eigenen Persönlichkeit. Stufenweise können wir die Annäherung an das Ernsterlebnis und an den Zusammenschluss von Trieben und Werten verfolgen. Sexuelle Tagträume (Phantasie) steigern sich zur sexuellen Betätigung (Ernsterlebnis); Idealschwärmerei (Phantasie) ist die Vorstufe der rein geistigen Liebe (Ernsterlebnis). Die beiden getrennten Gebiete, Geschlechtstrieb und werterfüllte Liebe, schliessen sich beim Erwachsenen zur Geschlechtsliebe zusammen. Ebenso sind Träume der Selbsterhöhung, die zunächst zu körperlichen oder sportlichen Leistungen führen, und künstlerische Plane, die in Versuchen Gestaltung finden, getrennt und vereinigen sich später in der ernsten Berufsarbeit.

Vom Standpunkt einer charakterologisch gewendeten Erlebnispsychologie ist die Reifezeit die Zeit der Prägung und Festigung der geistig-körperlichen Persönlichkeit sowie jene Ausbildung und Formung des Charakters, die den jugendlichen Menschen fähig macht, die beiden Unendlichkeiten, Trieb- und Wertwelt, in die eigene endliche und beschränkte Individualität aufzunehmen und in sich zu versöhnen.

Richard S. Uhrbrock. *Estimating Intelligence from Photographs.*

Photographs of six men from the highest ten per cent and six from the lowest ten per cent of a group of 600, who had taken the Thorndike Intelligence Test, were judged for intelligence by 253 men and 350 women, unacquainted with the subjects.

Eight of the twelve photographs were classified correctly. Two

cases, *I* and *K*, are particularly interesting. *I* was estimated as *low* by 75.1% of the men and by 81.4% of the women. *K* was estimated as *high* by 70.4% of the men and by 78.3% of the women. They had equal intelligence test scores. The first photograph showed a drooping mouth, a snarl, and averted eyes; the second a pleased, agreeable expression, with eyes looking straight at the camera.

The accuracy of judges in classifying certain photographs, however, is statistically significant. From the point of view of personnel practice three problems arise worthy of investigation. Are certain facial characteristics consistently associated with high or low intelligence? Are estimates of intelligence dependent upon certain facial expressions that can be controlled? How nearly can a candidate select that photograph of himself which will be rated highest, or which most accurately represents his intelligence level?

MORGAN UPTON. *The Geotropic Conduct of Young Guinea Pigs.*

The possibility of obtaining quantitative description of geotropic orientation as related to the magnitude of the effective gravitational excitation has been demonstrated for several animals such as young rats and mice, slugs, several arthropods and others. The interpretations of the facts of geotropic behavior lead to the view that orientation upon an inclined surface is determined by the distribution of the muscular stresses resulting from the pull of the animal's weight upon the two sides of the body. It is assumed that the orienting animal orients until the stress or pull upon the two sides is equivalent.

It has been found that young rats and mice orient in a way such that the relation between the angle of orientation θ and log $\sin \alpha$, where α is the angle of inclination of the plane upon which the animal creeps, is slightly sigmoid. Young rats and mice creep with their bodies in contact with the substratum and because of this it was desired to investigate the geotropic conduct of a mammal which progressed with the body clear of the supporting surface.

Young guinea pigs were chosen and the technique employed in the collection of the data was essentially the same as that used in the work with rats and mice. The results indicate that in principle the formulation in the cases of rats and mice holds essentially for guinea pigs. The relation of θ to log sinα is sigmoid in character. It is, however, notable that in this case the function is in reality compound, being made up of two sigmoid curves with the break occurring at an inclination of 45°. The break is accounted for by the fact that the mode of progression changes at this inclination. At inclinations below 45° progression is by walking, while above 45° walking is replaced by a jumping movement involving a different manner of extension of the legs. The break is substantiated by the way in which the variability of the measured response is found to change at inclinations higher than 45°. The variability of response is the same kind of a function of the slope of the surface as the amplitude of response is found to be.

D. USNADZE. *Einstellungsumschlag als Grundlage der Kontrasttäuschungen.*

Gibt man seiner Versuchsperson zwei gleich grosse aber verschieden schwere Körper mit geschlossenen Augen bloss tastend in Bezug auf ihre Grösse zu vergleichen, so wird in Mehrzahl der Fälle der schwerere kleiner, der leichtere grösser erscheinen. Dasselbe wiederholt sich bei der optischen Vergleichung derselben Körper.

Lässt man zwei gleich schwere aber volumverschiedene Körper auf die Haut der Hand mit Hilfe der Strattonschen Druckwage drücken, so erscheint der grössere einen weniger intensiven Druck auszuüben als der kleinere. Es ist also erwiesen, dass bei der Schätzung der Druckintensität, wie auch der Grösse der Körper, taktil wie optisch, eine Illusion auftritt, die der bekannten Gewichtsvolumtäuschung ganz analog ist. Die Erklärung dieser Erscheinung kann demnach keineswegs in speziellen Bedingungen der betreffenden Sinnesapparate, etwa in Hebimpulsen u. ä., gesucht werden.

Weitere Versuche ergaben folgende in Bezug auf verschiedene Sinnesmodalitäten geltende Gesetzmässigkeit:

Wirkt bei einer ausgeprägten Einstellung ein Reiz ein, der wegen seiner vom Einstellungsniveau allzu abweichenden Natur nicht entsprechend assimiliert werden kann, so schlägt die gegebene Einstellung in die entgegengesetzte um und der Reiz, indem er auf Grund der letzteren aufgefasst wird, löst die Kontrastwirkung aus.

Weitere Versuche zeigen: der Kontrasteindruck ist im Momente der ersten Reizeinwirkung am stärksten; alsdann klingt er allmählich ab. Die Kontrasteinstellung ist also als richtige Uebergangseinstellung anzusprechen: sie ist am Anfang, beim Umschlag, am stärksten, dann aber räumt sie der dem kritischen Reiz entsprechenden Einstellung den Platz ein. Demgemäss kann sie keineswegs als ein fester, abgeschlossener, in sich ruhender *statischer* Zustand angesprochen werden. Sie muss vielmehr einen Uebergangscharakter, eine klar zutage tretende *dynamische* Prägung haben, was seinen bewussten Ausdruck darin findet, dass bei einigen Vpn. ganz klare dynamische Erlebnisse, sogenannten Uebergangserlebnisse, z. B. des 'Grösser-bzw. Kleinerwerdens' der Objekte, aufzutreten pflegen. Diese Erlebnisse dürfen nicht als primäre Bedingungen der Kontrasteinwirkung angesehen werden: sie sind nur sekundär bedingte Erscheinungen, die der dynamischen Natur der die Täuschung erzeugenden Uebergangseinstellung erwachsen.

Die Stärke der Täuschung ist durch den Ausprägungsgrad der zu zerstörenden Einstellung bedingt: je ausgeprägtere Einstellung zerstört wird, desto stärker wird der Umschlag und folglich desto grössere Kontrastwirkung übt der Reiz aus. So wird es verständlich, dass in unseren oben angegebenen Illusionen die Täuschung nicht überall gleich ausgeprägt zutage tritt. Denn die Einstellungen, die in unseren Fällen durch die betreffende Teilinhalte hervorgerufen werden, sind nicht in allen Fällen gleich stark. Sie ist am stärksten in gleichschweren, aber verschieden grossen Körpern, weil beim Versuch die Grösse zeitlich früher wahrgenommen wird, als das Gewicht. Die Gewichtsvolumtäuschung ist deshalb bedeutend ausgesprochener als die oben konstatierten Grössen- und Drucktäuschungen.

Warum schlägt die gelöste Einstellung gerade in die entgegengesetzte um? Weil die Einstellung ein in der Tiefe liegender Reaktionszustand ist, der im Bewusstsein primar als *emotionales* Faktum gegeben ist. So ist es begreiflich, dass am meisten ausgesprochenen Analoga der ' Kontrasttäuschungen ' gerade auf dem Gebiete der Gefühlserlebnisse angetroffen werden.

J. VABALAS-GUDAITIS. *Ein stummes reaktologisches Testsystem zur Bewertung von natürlichen Schulleistungen.*

Verfasser ist bestrebt seine Tests so aufzubauen, dass deren Lösung minimale Leistungen beanspruche und dass jede Testlösung eine bestimmte psychische Funktionsart (zentripetale, zentrifugale, oder zentrale) besonders stark beteilige. Aus organisch verbundenen Tests lässt sich ein einheitliches psychologisches System bilden, mit dessen Hilfe Verfasser die Leistungsfähigkeiten in qualitativer, quantitativer, und struktureller Hinsicht bewertet. Das System besteht aus 9 Tests, zu 22 Aufgaben in jedem Test. In den ersten 6 Tests sind Punkte in Kreise von ca. 5 mm. Durchmesser zu setzen unter folgenden Bedingungen: im I Test, nur in diejenigen, in denen keine vorhanden sind; im II, nur in solche, bei welchen wenigstens eine der drei oberen kleineren Kreischen dünner resp. dicker als das entsprechende untere kleine Kreischens ist; im III, nur in solche Kreise, wo zwischen oberen und unteren Zeichen (Punkten, Strichen, etc.) ein Unterschied besteht; vertikale und horizontale Striche gelten für gleiche; im IV, ähnlich wie im II; im V, nur in solche Kreise, wo die Summe aller um ihn herum gelagerter Zeichen eine paarige Zahl ergibt (schwarze Punkte zählen nicht mit); im VI, müssen die Bedingungen aus Tests IV and V innegehalten werden. In den letzten 3 Tests sind vertikale resp. horizontale (je nach der entsprechenden Klausel) Striche von einem Kreisende bis zum anderen so zu ziehen, dass der Mittelpunkt getroffen wird, der Strich aber nicht ausserhalb der Kreisgrenze zu liegen kommt.

Die Versuche mit 100 Studenten und 100 Schülern ergaben folgenden med. Werten für Studenten: Test I, 60; Test II, 80; Test III, 151; Test V, 180; Test VI, 197; Test VII, 80. Alle Werte sind in 0.01 sec. ausgedrückt und sind als durchschnittliche Arbeitsdauer pro Testaufgabe zu verstehen. Die Zeitdauer der V + VI Tests in Beziehung gesetzt zu den Noten im Reifezeugnis ergibt einen Correlations Quot. —0.75; alle Schüler welche die Lehrer für begabte halten geben ohne Ausnahme kürzere Arbeitszeiten als die unbegabten oder mittelbegabten. Das Verhältnis der Zeitwerte des Tests II + III : V + VI : I + VII ist für Studenten: 0.6 : 1.0: 0.4, wobei V + VI = 377. Für Kinder von 12 Jahre, 0.5 : 1.0: 0.4, wobei V + VI = 733. Für Kinder von 8 Jahre, 0.8 : 1.0: 0.3, wobei V + VI = 1,100. Für Kinder von 4 Jahre, 0.3 : 1.0: 0.4, wobei V + VI = 1,842. Diese Verhältnisse bleiben konstant bei Studenten (*en masse*) und schwanken bei Kindern: Im Alter von ca. 4 Jahren sind sie " Sensoristen;" im Alter von ca. 8 Jahren sind sie " Motoristen," und im Alter von ca. 12 Jahren sind sie " Intellektualisten." Die Zeitdauer für Tests V + VI nimmt regelmässig mit dem Alter ab.

W. L. Valentine. *The Lectometer.*

The lectometer is an instrument which automatically measures the time required and the errors involved in copying a series of dots into a series of tables. The dots are arranged on blocks at the subject's left and the tablets are switches on his right. There are five blocks and five corresponding tablets.

This demonstration of the lectometer serves a two-fold purpose. In the first place, it describes a specific piece of psychological apparatus which has been used in two unrelated investigations, and, in the second place, it serves as a demonstration of the use of standardized telephone equipment in the construction of similar instruments.

In the first investigation just mentioned, the lectometer was used as a vocational testing device. According to Max F. Meyer, the original designer, the instrument measures how well the subject reacts to visual stimulating conditions.

When used as a testing instrument the subject is instructed as follows: "When you are ready to start on the problem push this button. This act releases this screen which will fly back and expose 5 blocks each containing a number of dots. Each dot is to be considered in relation to one of these switches and you are to copy the dots onto the switches in this way: For every dot in the *top* row on the block push back a switch on the bottom row on the tablet, and for every dot on the bottom row on the block push back a switch in the top row on the tablet."

After the experimenter is sure that the subject understands the procedure so far, he instructs the subject that for every error a red lamp will light up and that the error must be corrected as soon as made; and that when the copying is completed a white lamp will indicate the fact. The subject is then given a preliminary test, permitted to work slowly and purposely to make some errors and correct them if he does not make them inadvertently.

The subject discovers that, so long as there is an uncorrected error, the white lamp will not light, even if the correct pattern has been copied.

The second investigation consisted in a learning experiment on the instrument. Here the subjects were given no instruction, except that when ready to start they must press the start button, and that they were to push back switches until they have all five lamps lighted. They had, then, to discover for themselves the formula you have heard in the instructions, or its equivalent. The blocks were changed every day, so that memorizing a pattern in the thirty switches was an inadequate solution.

M. J. VAN WAGENEN. *The Empirical Verification of Formulae in the Process of Correlation.*

Approaching the process of correlation from the viewpoint of the factors entering into related variables, series of quantities, distributed in accordance with the expansion of the binomial expression, $(\frac{1}{2} + \frac{1}{2})^n$, and unrelated to one another, were combined in various ways and with various constants or weightings to produce variables whose factors were known. Among such variables the coefficients of correlation were obtained by the use of the Pearson products-moments formula; they were free of errors of measurement and of errors of selection. From an analysis of the coefficients obtained in this manner and of their relations to the weighted factors entering into the variables from which they were derived, a formula was deduced inductively for deriving the products-moment coefficient of correlation from the known factors entering into the variables.

This formula is:

$$r = \frac{\text{Sum of products of weights or constants of common factors taken separately}}{\sqrt{\text{Sum of squares of weights of all factors in first variable}}\sqrt{\text{Sum of squares of weights of all factors in second variable}}}$$

When it is applied to present formulae involving the use of correlation, it gives a method of determining empirically the limits within which the formulae hold true. When applied to Spearman's formula for correcting for errors of observation the method demonstrates that the formula holds true even when the errors of measurement are coarser in one test than in the other of the same trait.

In applying the formula to the results of the process of partial correlation, it reveals that the formula holds true only when the variable to be partialled out contains no factors that are not common to the other two variables, and only when the common factors are weighted in the same proportions in all three variables, except when the variable to be partialed out contains only a single factor.

When applied to the formulae expressive of the percentage relation between variables, it shows the conditions under which each holds true and also indicates that the weighted independent factors have a different quantitative effect upon the product-moment process from unweighted independent factors; hence coefficients expressive of relations between variables are comparable only when the weightings of the factors entering into the variables are known.

Its application to the tetrad equation of Spearman shows that all the tetrads among four variables will equal zero regardless of the number of unrelated factors entering into g, provided all the common factors appear in three of the four variables and are weighted in the same proportions in these three variables.

J. van der Veldt. *The Photographic Registration of Movements.*

It is my purpose in this report to restrict myself to a question of fact, namely, to the enumeration of certain results to which photographic method led me in the study of movements. The movements of which there was a question in my experiments were complex, comprising four or six changes of direction. They had been learned by the subjects in the following way. On the appearance of an excitant word in the mnemometer, the subjects had to touch different points on a reaction-board, according as small electric lamps, placed at these points, were illuminated. This light-board was the equivalent of the keyboard of a typewriter. By intense exercise these movements were stereotyped in such a way that in the end a more or less high degree of automatization was reached, which made the subjects, on the presentation of the 'name' of the required movement, capable of writing it down, much in the same way as one writes one's signature. In order that the trajectory of these movements might be photographed, the subject carried on the index finger a small electric lamp, lit by means of a current which was interrupted fifty times a second. The photographs of the movements (kinesigrams) obtained by this method seemed capable of rendering good services for the study of the adaptability and the starting of movement.

1. Can automatized movements be adapted to altered conditions, for example, when they have to be performed on a reduced scale (on a piece of cardboard three and a half times smaller than the large light-board) and in a different spatial condition? By photographic recording, both of the normal and of the reduced movements, we reached the following conclusions.

(a) The time necessary for the execution of the various sections of the movement can be calculated exactly.

(b) The magnitude of the error committed in reaching the exact touches is made visible.

(c) The kinesigrams show us a division among the subjects. Some reduce the movement which they have learned in an altogether automatic way; others accomplish it according to a sensory scheme which serves as a model.

(d) From the point of view of exactitude, the reduced movements automatically preserve the primitive form of the movement, while the reduction which takes place under the influence of visual images undergoes transformations corresponding to those which occur in the image itself.

2. In these experiments, in which word and movement had been joined together a great number of times and intentionally, cases were recorded in which, in the presence of the same excitant, the acquired movement was performed, or at least tended to be performed, although another movement was required according to the instruction, and, consequently, without the subject's having the intention of executing the acquired movement. In these conditions, likewise, photographic method can help to make these movements or beginnings of movement objective when they take place.

P. E. Vernon. *The Impracticability of an Objective Test of Personality.*

The aim of a test of personality should be to predict, on the basis of an observer's reactions to a simple, well-defined test situation, how his behavior in real life is likely to be affected by his personality traits, such as his intelligence, temperamental tendencies, *etc.* Psychologists naturally aim at systematization and standardization of method, thus hoping to give their tests scientific and objective validity. Actually, in so far as this is done, the test situation inevitably becomes artificial and fundamentally unsound, owing to the neglect of the complexity of subjective factors involved, such as the personal relations of the observer with the experimenter, the observer's self-consciousness, his nervousness, his motives, and the like. Moreover, personality and temperament are integrated wholes or organizations; they cannot be put into simple quantitative terms.

Hence the most profitable method of approach seems to be direct qualitative observation, even the use of non-objective intuition, conditions being as normal as possible. It is the subjective situation that should be considered, the meaning the test has for each particular observer.

The writer has tried out the Downey Individual Will Temperament test fairly extensively and finds it very unsatisfactory for these reasons. By giving simple performance tests and the like, and recording the observer's natural reactions, many temperamental traits emerged which seemed to agree well with their characteristics in actual life. This type of method is capable of considerable development and is of real practical and diagnostic applicability.

P. E. VERNON. *The Psychology of Music: Its Scope and Methodology.*

The unsatisfactory status of the psychology of music is due to lack of realization of its true province, namely:

(a) A full description of all the psychological factors concerned in any musical activity. The listener should be considered first; the varieties of methods of musical appreciation are still almost unexplored.

(b) Experimental proofs of the constancy, relevancy, and significance of such factors.

(c) A classification and generalization of these results in terms of recognized psychological principles. Owing to the inadequacy of (a) and (b) this has scarcely been attempted. Until it is done the more usual approaches cannot be theoretically justified. They are:

(d) The critical study of musical works and of aesthetic principles.

(e) Scientifically conducted investigations in pedagogical applications or tests of musical capacities, experiments on the response to simple tones, intervals, *etc.*

At present these too philosophical and the too scientific methods of approach build up mutually exclusive systems and explanations.

Those who have tried to investigate the initial and central problem of the nature of appreciation have not sufficiently considered the difficulties and dangers of their experimental methods. Many of the experiences in listening to music are auditory, organic, or kinaesthetic, and not easily put into verbal terms. Time is such an essential constituent of the experiences that ordinary retrospection is impossible. Most musical people have no psychological training in introspection, while the average psychologist seems to know even less about music. He generally regards the somewhat intellectual appreciation of the trained musician as anomalous or negligible; the music he has employed has been consistently bad and almost incapable of arousing any genuine aesthetic experience. In standardizing the experimental conditions, for example, in using gramophonic reproduction, he makes the situation artificial and the results inapplicable to normal appreciation in a concert hall. If, on the one hand, he uses free and uncontrolled introspection, his observers' and his own biases enter in selecting and interpreting the data. On the other hand, if the observers are asked specific questions or told to rate specific emotions or aspects of the music, he is distorting their thoughts into his own grooves, entirely failing to realize the enormous individual differences in their mental organizations and methods of appreciation.

MORRIS S. VITELES. *The* Gestalt *Point of View in Applied Psychology.*

The application of psychology in individual adjustment in school, in industry, in the home, *etc.,* has been characterized by an exclusive concern with the so-called elements of personality. So, for example, intelligence has been singled out as one factor in individual adjustment, and isolated from others associated with it in creating the pattern of personality and of individual behavior. A feeling of inferiority, susceptibility to accidents, motor impulsion, ability to benefit from college training or from an apprenticeship in industry are additional examples of elements supposedly freed from association with, and the influence of, others in the development of tests and of testing techniques in applied psychology. It is such an emphasis upon single elements that has made it possible for school teachers and many psychologists to use the term 'IQ' as though it gave a complete picture and explanation of human conduct, and for the psychologist in industry to use a test score as though in it were represented the exact status of a single phase of personality that has supposedly been completely segregated and subjected to measurement.

Applied psychology has accepted as a point of orientation not the individual whose behavior, in the final analysis, determines his adjustment, but isolated sectors of the individual *ego*. It has been assumed that the individual *ego* is a sort of mosaic, and that the sum of the individual components in this mosaic constitutes the whole. It is undoubtedly true that a detailed examination of each component tells much about the structure of the mosaic, but in its final analysis the contribution of each to the value of the whole flows from the integration of the various parts and can be fully determined only through an examination of the *whole* and of the *interrelationships* among the parts in the whole.

In its insistence upon behavior as a configurational response,—a reaction pattern in which each act attains meaning and is what it is by virtue of its part in the total situation confronting the organism,—*Gestalt* psychology has much to contribute in the way of point of view and method to the development of applied psychology. In the insistence upon the unity of the pattern of behavior, *Gestalt* psychology resembles what has been described as the clinical viewpoint in applied psychology. To discuss the significance of this newer orientation in applied psychology is the general purpose of this paper.

Morris S. Viteles. *Variability in Proneness to Errors and Accidents Among Electrical Substation Operators.*

It is extremely important to know whether individuals who are highly susceptible to personal injury maintain as high a working efficiency as those who characteristically fail to sustain injuries. The purpose of this informal report is to present the results of a preliminary study of the relationships between susceptibility to accidents and the working efficiency of electrical substation operators. A comparison of the accident records and error records of 114 substation operators, including all operators with one or more years of service employed by the Philadelphia Electric Company, shows a definite relationship between errors and the incidence of personal injury. Sixty-three operators who have been free from errors average 0.48 accidents per man. The average number of accidents of 1- and 2-error men is similarly low, being 0.56 accidents and 0.25 accidents per man, respectively. However, in the case of operators who have been responsible for 3 or more errors, the average is 1.28 accidents per man, or over twice the average for men who have been responsible for 0 to 2 errors, inclusive. Other similar figures are presented in evidence of a positive relationship between accidents and errors, a relationship which would bear further investigation both in the case of substation operators and in the case of other classes of workers.

L. S. Vygotsky and A. R. Luria. *The Function and Fate of Egocentric Speech.*

1. By a series of investigations a specific stage in the development of child speech was found, a stage which Piaget characterized as " egocentric speech." It was supposed that this term of verbal behavior was only an expression of the general autistic attitude of the child. This form of speech, as was shown by some investigators, disappears with the development of the social behavior. The function of egocentric speech and the psychological mechanisms responsible for its evolution were still unclear.

2. Our experiments, concerned with the problem of the function of egocentric speech, showed that this form of verbal

behavior always appeared very frequently when the child was confronted with a difficult situation. By making the performance of an acitivity difficult we obtained on the part of the child an explosion of egocentric speech reactions; these reactions, however, were not merely a process accompanying the main activity of the child, but were directed towards the solution of the problem. The child was trying first to solve the problem verbally, in order to organize its subsequent activity. These experiments show that egocentric speech is not merely a kind of accompanying process, but has a *specific organizing function,* which distinguishes it from other processes in the child's behavior.

3. By observing the development of egocentric speech we find that this function does not simply disappear, being replaced by a socialized form of verbal behavior. Its planning functions are taken by specific pauses which have an intellectual character and are filled by internal speech. The qualitative analysis of the exteriorized internal speech shows its resemblance to egocentric speech with respect to its structure, function, and genesis. The analysis of this process shows that egocentric speech becomes internal in its evolution, remaining as a specific function directed to the organizing of the child's own behavior.

4. On the strength of our experiments we consider it possible to change the traditional schema of the verbal evolution of explicit speech, viz., external speech—internal speech, into external speech—egocentric speech—internal speech. We thus consider egocentric speech as one of the most important processes having a specific function in the evolution of the cultural behavior of the child.

J. E. WALLACE WALLIN. *The Nature of* g, *as Seen by the Clinical Psychologist.*

Just as the practical engineers are not much concerned with the ultimate nature of the phenomena with which they deal, leaving such questions to the academic physicists, chemists, and metaphysicians, so the clinical practitioners using tests of intelligence have not greatly concerned themselves with questions pertaining to the ultimate quality of the function they set out to measure. They have considered that the problem is of more theoretical than practical importance, that the general factor, whatever it is, cannot be measured by any single test but only by the pooling of a large number of tests of specific traits, that a fairly accurate average measure of general intelligence will be obtained by an extensive exploration of many specific traits or a less extensive exploration of representative specific traits, and that the validity and reliability of their results can be adequately determined by the measures in conventional use and by careful follow-up work on individual cases.

But the psychological practitioners should not blind themselves to the fact that improvement in scientific technique of testing and analysis of ability waits upon the solution of fundamental theoretical questions in psychology. Nothing is of more importance to the progress of scientific guidance than the determination of such questions as these. Are there general factors of intelligence, motility, emotivity, *etc.,* and, if so, how shall they be defined and how can they be measured? Are there also specific factors in each of these fields? What are they, how shall they be defined and measured, are they independent or interdependent? What general and specific traits condition success in any trade, vocation, or profession? What particular traits must be included in reliable comprehensive trait analyses of the legion of vocations for which a completely adequate system of public education should prepare the youth of the land? No body of scientific knowledge now exists adequate for satisfactory answers to these questions. It would be presumptuous to maintain that much more than the outline to the prolegomena of such a science has thus far been sketched, so multifarious, intricate, and baffling are the problems of trait differentiation and measurement.

J. E. WALLACE WALLIN. *The Training of Clinical Psychologists for Psycho-Clinical Practice.*

It is notorious that a number of universities now provide a rich background of psychological, educational, sociological, psychiatric, and related training which eminently qualifies Ph.D.'s in clinical psychology to direct bureaus or clinics for mentally maladjusted children.

It is equally notorious that it is becoming increasingly difficult for adequately trained and experienced clinical psychologists to obtain such positions without the M.D. degree, and therefore they have no recourse except to assume minor clinic positions as mechanicians, or to renounce clinical work and to find positions in teaching or research, although they much prefer to devote their time to clinical service.

Therefore departments of psychology should square themselves with the situation: they should either inform their students that there is little future for upstanding clinical psychologists without the M.D. in psycho-clinical examination work, and advise them to transfer to the medical schools, although these schools provide little training for the fundamental psychological work which needs to be done; or, if they are convinced that adequately trained clinical psychologists are fully competent to direct bureaus or clinics for mentally and educationally deviating children, and, in consequence of this conviction, continue to train clinical psychologists for clinical service, then they should assume the obligation of seeing to it that clinical psychologists are given an 'even break.' Legislation enacted in some states shows that psychologists need not be discriminated against if the psychologists but place their case before the bar of enlightened opinion and secure the coöperation of educational, social-service, and legislative organizations.

C. J. Warden. *The Measurement and Comparison of Animal Drives.*

The methodological difficulties arising on the experimental side in the attempt to measure and compare the various drives of an organism are discussed briefly. This is followed by a summary of the main results obtained in an extensive project on drive behavior in the white rat recently completed in the Columbia laboratory. The relative strength and persistence of the hunger, thirst, sex, maternal, and exploratory drives, as measured by a new method, are discussed, and the possible extension of the method to similar problems and to various types of organisms is indicated. Some theoretical considerations relating to the rôle of dynamic behavior in the interpretation of the behavior of the organism are offered.

C. J. Warden. *Variations in Length of Pattern in a Symmetrical Animal Maze.*

This study is a preliminary attack upon the problem of the relative difficulty of serial motor performances which vary only in length. The problem has hitherto been ignored in the field of animal learning. Results with the white rat were secured on five serial patterns representing lengths of 2, 4, 6, 8, and 10 identical units. An analysis of the data shows that the addition of units in the animal maze does not have the effect of increasing the relative difficulty of fixing the series, as has been generally found to be true in the field of human memory. There is, indeed, some indication that the longer the series the lower the unit score, a finding quite the reverse of those in the memorization of verbal series. Some suggestions toward an explanation of the divergence between verbal and motor fixation, in so far as the factor of length of series is operative, are offered.

C. J. Warden. *Punishment as a Deterrent in Animal Reactions.*

While it is true that the student of human sociology cannot take over directly, from the field of animal behavior, experimental findings on the effectiveness of punishment as a deterrent to reactions, as such, it is just as true that the psychology of punishment as related to crime cannot be placed upon an adequate genetic basis without first determining the relation of punishment to animal behavior, especially as regards the higher animals. The methodological difficulties in experimental work on punishment and reward in animal work are discussed, and the inquiry is raised as to whether similar difficulties may not hold in making analogous determinations in human social situations. The question as to the applicability of the notion of social categories, such as crime, *etc.*, to infra-human behavior is discussed along with the evidence, if any, for the beginnings of anti-social behavior in animal societies.

Howard C. Warren. *Dynamic Psychology.*

Introspection and behavior study may be regarded as two methods of investigating phenomena which belong in one and the same field of research. Psychology, in a broad sense, is the study of the adjustments of an organism to the ever-changing conditions about it and within its own body. Responsive adjustment is an indirect effect of certain forces applied to the organism, as distinguished from the direct physical reaction to the action of forces. The stimulus-response chain of events is characteristically different from other physiological processes. In this special type of operation, organism and environment interact through mutual communication of effects, rather than by transfer of material substance.

Dynamic psychology is the investigation of the adjustive movements of organisms in the light of their origin, evolution, and meaning, as processes which enable organisms to cope with successive situations, to survive, and to propagate.

Stimulation depends upon the existence of some physical force in the creature's habitat, upon the evolution of a specific receptor, and upon the value of the stimulus to the creature. Response depends upon the evolution of specific effector organs and upon their value in promoting adjustive responses.

The stimulus-response operation is a systematized unit. The significant fact is that the organism, by its adjustive movements, is better able to *keep itself alive*. Psychology, as a study of nature, is concerned not so much with the elementary laws of stimulation, neural activity, and muscular contraction as with certain general types of adjustment, such as feeding, defense, mating, locomotion, social communication, and various higher intelligent activities.

Internal stimuli are important factors in determining the adjustive response. They are neither more nor less dynamic than external stimuli; such terms as drive, urge, striving, tend to obscure the close relation between these two classes of adjustment initiators. Overemphasis of the drive seems largely responsible for the teleological conception of psychology.

The dynamic view of psychology finds room for the notion of *control,* not as a normative concept but as an historical fact. The ability of the simplest organism to alter the direct physical effect of forces by an indirect reaction enables it in a measure to modify its destiny. Each successive advance in neural organization increases the scope of this control, which culminates in man. Civilized man is able not merely to cope with the environment, but to transform it; he actively directs the course of physical events.

M. F. Washburn. *Köhler's Discussion of Association.*

All the points mentioned by Köhler in his chapter on *Association* as explicable only on the configuration hypothesis can be adequately dealt with by motor psychology. The latter does not assert that two sensory processes are associated by occurring together; it holds that they are associated through being reacted to together. It recognizes the existence of simultaneous movement systems: Köhler's objections imply that he thinks of association as the formation of successive systems only. It can explain the various form elements and relational elements which are independent of sensory content as due to kinesthetic processes.

M. F. Washburn. *The Nature of* g.

It is more reasonable to suppose that *g* depends on a peculiarity of structure in the cortical engine than to make it depend on quantity of mental energy. The conception of mental energy as distinct from nervous energy should be avoided if possible on the principle of parsimony. The factor, *g,* is not correlated with quantity of nervous energy, which would include the energy manifested in emotion; it is not correlated with quantity of nervous energy operating in the cortex, for then it would be shown in reproductive as well as in eductive processes. The difference between reproductive and eductive processes is that between lack of analysis and analysis, and such a difference may best be accounted for by making *g* depend on a special type of cortical structure giving detail responses rather than mass responses. The law of mental span does not imply that *g* depends on quantity of mental energy, for mental span does not correlate with *g*. The phenomena of fatigue and inertia, involved in oscillation and perseveration, belong not to energy itself but to engines.

M. F. Washburn. *Some Tests of Introversion and Extraversion.*

The first part of this study attempts to find whether there exists between extraverts and introverts any reliable difference in auditory reaction-time or in perseveration measured by the speed of rotation needed for retinal fusion. The results are negative. The second part of the study aims at a revision of the Freyd questionary, taking account of (a) the agreeable or disagreeable aspect of the traits named, and (b) the tendency of certain pairs of traits to overlap so that one of them might be omitted in the questionary.

M. F. Washburn. *Orientation and Purpose in Learning.*

In the process of maze-learning two factors are always involved: a series of movements and a drive, or state of inner unrest. There is considerable evidence that a third factor operates, namely, orientation towards the goal. Does this orientation depend on external factors? Smell of the food is not necessary: recent experiments in the Vassar laboratory show that orientation is equally well achieved whether milk is in the center during the running or placed there after the mouse has arrived. That visual surroundings need not furnish the clue has been shown many times. Orientation must be an attitude internally preserved rather than forced by outside stimuli. Cornetz found that ants in their wanderings tend to restore the direction in which they started out. Recent Vassar experiments with a straight maze indicate that the initial direction may have some influence on orientation in mice. But orientation occurs well in the circular maze, where no run is in the direction of the food.

A striking analogy exists between this process and that which occurs in purposive thought and action. These occur when the energy of the drive discharges, not merely into restlessness, but into an inner attitude that checks irrelevant ideas and actions. Cameron has shown, in opposition to Lashley's findings, that maze-learning in rats is disturbed by lesions of the frontal lobes. On account of their anatomical connections the frontal lobes have been regarded as intimately related to purposeful thought and action. It is suggestive, certainly, that Marie reports as characteristic of human cases, where frontal lobe lesions exist, a peculiar syndrome involving inability to find one's way! May orientation in path-finding be the ancestor of orientation in thought?

GOODWIN WATSON. *A Technique for the Study of Worship.*

In connection with a conference of 500 boys, ages 14 to 20, seven services of worship were prepared. Each contained a distinctive feature. One was an organ selection, another a story, another a long heroic poem, another stressed the intellectual and scientific interpretation of the universe, another the ethical contrast between our standards and the results in our social order. At the close of each service the boys rated the service on a seven-point scale, using cards previously placed in the pews. The scale ranged from " as intense an experience of worship as I have ever had; one of the high points of my life," to " very poor, definitely not worshipful, bored me, couldn't understand it, wish it had been left out entirely." At the conclusion of the seven services which occurred during a three-day conference, each boy was asked to rank the seven services in order of worshipfulness. The assumption was that one need not go behind the report. When an individual thinks he worships, he does. When he feels no such experience, he is not, according to his standards, worshipping. Results are tentative until the same services can be tried out in other settings and until other services can be studied. They point to a possibility that excellence of worship services is connected with (1) emphasis upon emotional rather than intellectual factors, (2) use of at least a minimum of traditional terminology, (3) familiarity with the procedure, and (4) absence of a great amount of printed matter to be read. Plans are under way for a multiplication of experiments like this first one.

GOODWIN WATSON. *A Comparison of Group and Individual Performance at Certain Intellectual Tasks.*

Sixty-eight graduate students worked at 'tests of higher level thinking,' including the following types: (1) interpretation of reading; (2) sentence completion; (3) arrangement of numbers to form equations; (4) number series; (5) vocabulary-opposites; (6) quantitative relationships; (7) code solving; (8) reasoning problems; (9) composition of a funny limerick; (10) composition of an original and difficult intelligence problem. Each test required for its solution more than the median ability of the class. The three forms of the test are constructed to be equivalent and rotated to adjust differences. The first form of all ten types was done by each individual in isolation. The second form was done by committees, four or five students coöperating. The third form was done as the first had been, by individuals alone. The averaging of first and third forms is shown to take care of increases due to practice. Comparison is made between the performance of these students on each of the ten types of test when working alone and the performance of a group of four or five working coöperatively. The results indicate a general answer to the question, "What is the intelligence of a coöperative group, and how does it compare with individual intelligence?"

GOODWIN WATSON. *Some Factors Related to Happiness.*

Six different scales for the recording of the subject's estimate of his own general level of happiness were given to four hundred students of educational psychology. On this basis the fifty who considered themselves happiest were compared with fifty nearest the median and with the fifty who regarded themselves as most unhappy. Comparison was made on over a hundred items of objective and subjective information. In general, the results indicate that the happy student is likely to be a man, married, above average in health especially in childhood, popular in school, active in extra-curricular life, to believe himself able creditably to tell jokes, to lead a discussion, to act in a play, to give a talk on sex, or to administer a group of workers, to have had an harmonious home, to enjoy his job, to prefer adventure to peace, and responsibility to direction. Among the factors irrelevant so far as happiness is concerned were intelligence, race, nationality, self-support, participation in religious organizations, physical disabilities, experience in athletics, size of home-town, size of high school, financial, social or educational status of family, and estimates of ability at swimming, diving, tennis, baseball, algebra, rapid reading, foreign language, drawing, painting, and writing poetry.

C. O. WEBER. *The Nature and Measurement of Emotional Age.*

A subject of 'low IQ' is led astray in the sphere of intellectual problems. Is there not a parallel phenomenon of 'affective amentia' exhibited by subjects who, because of emotional and instinctive immaturity, lack insight into social situations? An intelligence test tells what a subject *can* do with intellectual problems: what determines what a subject *will* do? Slowly but surely the belief is gathering momentum that *regression* in the sphere of instinctive and emotional age plays as important a rôle in mental pathology, delinquency, retardation in the schools, *etc.,* as does mental deficiency.

A tentative 'emotional age scale' was devised, based upon the few but suggestive achievements of modern psychology in this field. The work of the Freudians, behaviorists, reflexologists, the analyses of Dewey, Shand, McDougall, and others, were the bases upon which this test was erected.

The results indicate (moderately, as is to be expected from a first attempt) that there is a real and measurable emotional maturation, which correlates with chronological age, school grade, physical maturity, and mental age.

DAVID WECHSLER, LILAH CRABBS, and R. G. FREEMAN.
Galvanic Responses in Pre-School Children.

The aim of this research was to investigate the availability of the psychogalvanic reflex as a means of studying the emotional reactions of pre-school children. Our method consisted of obtaining galvanic responses to each of a standardized series of stimuli from some thirty children, aged 2 to 4, and in correlating the measures so obtained with emotional ratings of the children given them by teachers and other members of the staff acquainted with them. The technique employed was the Wheatstone-bridge method. Criteria of galvanic responsiveness were magnitude of galvanic deflection, frequency of spontaneous reactions, number of zero responses (failure to give any reaction to stimulation), Correlations were obtained between these criteria and ratings with respect to emotivity as a whole or only specific items, *e.g.* excitability, anger, depression. Supplementing the above, data were also obtained as regards the effectiveness of different types of stimuli, sex-differences, and the reliability of the galvanic experiment as measured by re-test correlations.

Results revealed small and unreliable, though positive, correlations between criteria of galvanic responsiveness and most ratings as regards specific or general emotional tendencies. The exceptions were the items, depression and instability, which gave coefficients of from 0.35 to 0.65 with several criteria. The best correlations were with zero responses, which were negative. There is also a negative correlation between intelligence and zero responses. Galvanic responses of the girls were uniformly greater than those of the boys. No age-differences appeared within the ages tested. Correlations between galvanic reactions to successive batteries of stimuli given at two to six week intervals were 0.55 to 0.75. The most effective stimuli were loud noises and threatened loss of balance (tipping); the least effective were the verbal stimuli.

D. Wechsler. *Apparatus for the Measurement of Chronaxie.*

David Wechsler. *On the Range of Human Capacities.*

Taking up Cattell's remark that the abilities of individuals seem to vary within the limits of 2:1, the writer has attempted to verify the extent to which the observation is confirmed by actual measurements, and, more generally, to see whether human capacities tend to vary within any definite limits. The question is of importance because, if it be found that human capacities do vary within a constant and numerically defined limit, we shall have come upon what might be termed a natural psychological constant.

The method of approach was to examine the range of distribution of individual performances on available psychophysical and mental tests, and to compare the extreme measures found. When this was attempted it soon became evident that in spite of the huge amount of published psychometric data, very little of it could be used. In the first place, measurements have usually been made only on selected samples of population, *e.g.* university students and school children. Secondly, the number of individuals measured by any given method has usually been small (under 100). Thirdly, the units of measurement are generally non-additive in character, owing either to the arbitrariness of the units chosen or to the inequality of the successive units of measurement themselves, as, for instance, when the successive problems in an arithmetical reasoning test are not of like difficulty. Nevertheless, where these (and other) sources of error have been eliminated, analysis of a number of distributions reveals that human capacities vary well within definite limits, and indeed within the narrow span of 2 to 5, more generally as 1:2 or as low as 2:3,—providing always that the distribution is Gaussian in character. Thus, the simple reaction time (light) ranges from 122.6 σ to 275.6 σ, or 2:2.2; span of apprehension (memory span for digits, adults) 5 to 10 or as 2:1; general intelligence (distribution of IQ's) 65 to 130, or as 2:1.

In calculating the range the span included has been roughly 99% of the cases (3 S.D.); the very extremes at either end were omitted as sports. Thus, in the measures of general intelligence, while IQ's range from below 10 to nearly 200, those falling below 65 (mental defectives) total only 0.33% of the cases, those above 130 ('near genius') only 0.55%.

From the results of the investigation there is definitely indicated that 'normal' human capacities vary within the approximate limits of 2:1, and that this ratio is of the nature of a natural constant.

G. E. WEIGAND. *Nocturnal Motility: Variations among Individuals and Groups.*

For the past three years we have employed the method of kymographic registration to determine the temporal variations in motility during a person's stay in bed. We chose the time spent in bed rather than the time spent in sleep because the criterion was more nearly indisputable.

We have secured data upon college men, middle-aged couples, tubercular women, and men and women suffering from functional neuroses.

The college men, totaling 21 subjects, studied during two academic years, show an average rest period of 12.8 ± 0.49 minutes, individual averages ranging from 7.3 to 21.5 minutes.

The average time to quiet down is 13.0 ± 0.7 minutes; individual averages ranging from 8 to 23 minutes.

The middle aged group, represented by nine married couples, have an average rest period of 10 minutes, the individual averages ranging from 6.7 to 14.6 minutes. For the men, the average length of the rest period is 9.2±0.7, individuals ranging between 6.7 and 12.6 minutes. For the women, the average is 11±0.6, with a range of 8.2 to 14.6 minutes.

This group requires an average of 14 minutes to get quiet after retiring, individuals ranging from 9 to 25 minutes. The average for the men is 15 minutes, for the women 13.

The psychopathic group, consisting of 16 women and 4 men, have an average rest period of 7.6, ranging from 5.1 to 12.3 minutes. The average for the men is 6.9, individuals ranging from 5.2 to 9.9 minutes; for the women, 8.2 minutes, ranging from 5.1 to 12.3 minutes.

Their average time required to quiet down is 36 minutes, the men requiring 34 minutes and the women 39.

We have complete data on 12 tubercular women who spent all of their time in bed. The records were taken from 8:30 P.M. until 5:00 A.M. This group shows an average rest period of 10.2 minutes, ranging from 7.7 to 15.6 minutes.

They require in the average 19.9 minutes to quiet down after the sleeping period has begun.

ALBERT P. WEISS. *Shall Psychology Revise Its Fundamental Postulates?*

Many of the attempts in the past to formulate the postulates underlying psychology have started with the assumption that the existence of a mind-body problem is self-evident. Where doubt arose, a metaphysical rather than a scientific analysis was made. There is now very little agreement among psychologists as to just what is to be included under the terms *mind, mental, experience, psychical, consciousness, purpose, etc.* Whatever agreement there was is becoming less, and the relation between physiological and so-called mental processes has reached such a degree of confusion that psychologists should seriously ask themselves the question: are both a mind and a body necessary for a clear understanding of the individual and social activities which make up modern civilization?

If psychology is defined as the science which investigates how the infant, as a biophysical organism, becomes an adult biosocial organism, is it not possible to eliminate the mental category? Of course those personality traits, which are now included under the term *mental,* must also find a place under the revised postulates, but if mind can be described as a biophysical or biosocial resultant, there is no need for a special mental entity. The immediate experimental program toward which such postulates point is an intensive investigation of the language responses, both as they develop in the individual and as they have developed in the race.

Specifically, the problem of mind (consciousness, experience, *etc.*) then becomes simplified into the experimental problem of determining how the biosocial use of the word *mind* is acquired by the child and how it was acquired by the race.

I believe it is possible to start with the fundamental assumptions of physics and with these only, and to show that man and the social organization of which he is a part is the resultant of the static and dynamic interrelations between the fundamental elements of physics (whatever these may be found to be). The science of psychology will then consist of a study of those biophysical stimuli, biophysical reactions, biosocial stimuli, and biosocial responses which make up the personal, domestic, public, vocational, and recreational activities of the individual.

ALBERT P. WEISS. *Meaning as Response.*

The responses to objects and events differ from individual to individual and for the same individual at different times.

Thus to an object, such as an orange, the same individual may respond by reaching for and eating it; he may hand it to someone else; he may describe its botanical relations; he may speak about its color, taste, odor; he may say that the odor and taste are pleasant or unpleasant, or, instead of saying this, the movements of his facial muscles and his handling reactions may become stimuli for others to which they may respond by classifying the orange as having a pleasant flavor. Whatever the particular response may be, it is the resultant of (1) the stimuli from the orange itself *plus* some of the other stimuli that are occurring with it, and (2) the earlier responses to oranges.

The variability in the responses of different individuals is the resultant of varying sequences of oranges and other nearly simultaneous stimuli which are rarely identical for two different individuals. We may refer to this by saying that objects and events do not have the same *meaning* for all individuals.

For the same individual, successive orange stimuli are not accompanied by the same non-orange stimuli. Therefore the responses of the individual to oranges may not be the same on all occasions. We may refer to this fact by saying that objects and events do not always have the same *meaning* even for the same individual.

For coöperation and interaction with other individuals it is necessary (a) to agree as to what responses are to be made to a given stimulus (an actual orange) under certain conditions, and (b) to be able to select the original stimuli (an actual orange) for which only a verbal substitute (a name or definition) is given. These are the *biosocial* or dictionary *meanings*.

Meaning is a term which may be used to indicate that our responses to objects and events vary, but that through language it is possible to establish a degree of uniformity in these responses which leads to biosocial interaction and coöperation between individuals.

BETH L. WELLMAN. *Speech Sounds of Pre-School Children.*

The development of pre-school children in the ability to produce correctly the consonant elements, consonant blends, vowels, and diphthongs of the English language has been studied in a coöperative investigation of the Iowa Child Welfare Research Station and the Department of Speech of the University of Iowa.

The procedure consisted in having the child give sounds spontaneously, without visual or auditory pattern. Toys and pictures were used to elicit conversation that would contain the desired sounds. The sounds were recorded in the symbols of the International Phonetic Association, and the position of the sound in a word—initial, medial or final—noted. The number of sounds tested was 66 consonant elements, 48 consonant blends, 15 vowels, and 4 diphthongs.

The subjects were 204 children from two to six years of age, attending the pre-school psychological laboratories. The reliability of the test, obtained by correlating halves composed of alternate sounds on the record blank, was 0.96 ± .01; for four-year-old children the reliability for consonant elements was 0.76 ± .05 and for five-year-old children 0.71 ± .06.

There were highly significant differences in the mean number of consonant elements and consonant blends given correctly by the different age-groups; there were significant differences in vowels given correctly when the five-year group was one of the pair, and in diphthongs when the two-year group was one of the pair. At two years of age 68.2% of the vowels were given correctly, 57.5% of the diphthongs, 39.7% of the consonant elements, and only 10.9% of the consonant blends. At five years the sound groups were about equalized, the percentages varying only from 87.2 to 90.0. Ability to produce vowel sounds correctly followed a different developmental pattern or calendar from that of ability with the other sounds.

The relative difficulty of the different sounds is being determined through (1) the number and percentages of children giving correct responses on each sound, (2) correlations between age-groups, (3) the number of correct responses according to position of the sound in a word, and (4) the number of correct responses on consonant element stops and fricatives.

The correlation between C.A. and number of sounds correct was 0.80 ± .03, between M.A. (Stanford Binet) and number of sounds correct 0.71 ± .05, between C.A. and M.A. .90 ± .02. When C.A. was held constant, the correlation with M.A. was — 0.01 ± .09; when M.A. was held constant, the correlation with C.A. was 0.51 ± .07. Correlations are being computed between speech ability and vocabulary, introversion-extroversion ratings, height, sitting height, weight, weight-height index, von Pirquet's pelidisi, perforation test, and number of children in family.

F. L. WELLS. *Interpretative Study of Particular Psychometric Methods.*

The central research problem of the writer's laboratory at this time is an interpretative study of particular psychometric methods. The chief factors involved are those of individual differences at various stages of the learning curve, and the analysis of changes in technique as subjectively experienced and reported. All subjects are in the upper 5% of *alpha* ratings, and the findings concern especially the mental processes of men and women in this developmental level. Among methods studied, and leads so far appearing, are the following.

With refined procedure, the familiar test of reversing the clock-hands is sufficiently a function of (1) attentional control and (2) ability to sustain working tension against impulse to overhasty solution, to suggest itself as a means of studying this attribute as a personality function.

The test, 'inverted forms' (Kuhlmann Revised Binet, Adult), is among the best suited to the study of evolving techniques. As elsewhere, the readiness with which the successive techniques are discovered is observed, and controlled in relation to so-called intelligence measures. Transfer in problems with changed patterns, and changed problem (*e.g.* rotation through 90° instead of 180°) are being observed.

An evolved pattern of the *Kombinationsmethode,* such as used in Stumberg's studies of poetic talent, when controlled in relation to *alpha* score, is looked to for a criterion of mental 'altitude' in the direction of symbolic imagination (cf. the Rohrschach test). It shows significance also for the study of mental trends.

To isolate so far as possible the factors of mental speed, standard opposite and addition tests are included. Differential practice effects are observed, as well as transfer and interference on changes of material. Modification of interference effects through purely physical changes in the experimental material has been of interest.

In general, the work has emphasized the necessity for separate evaluation of psychometric speed and accuracy, in spite of the general correlation that exists between the two. However convenient from the administrative standpoint, scores involving the two factors are unsuited to any but the simplest interpretative study.

The admitted, if not obvious, occurrence of transfer between 'identical' elements, should not obscure to us the subjective character of what constitutes this identity. Though there is no reason to suppose that this identity is wholly a function of *alpha,* it is plain enough that what is an identical element to '*alpha*-190' will not necessarily be so to '*alpha*-140,' and '*alpha*-140' will in turn perceive far more such identical elements than will '*alpha*-60.' It is a question if the whole topic of formal discipline ought not to be reoriented with more reference to this fact.

WESLEY RAYMOND WELLS. *Hypnotizability* vs. *Suggestibility.* Since the time of Liébeault and Bernheim, the suggestion theory of hypnosis has been commonly accepted. Hypnosis has been described most frequently in terms chiefly of an extreme degree of the working of suggestion. Sidis made a critical distinction between what he called direct and indirect suggestion, defining hypnosis in terms of direct suggestion. The contention of the present paper, however, is that the condition of hypnosis, and especially the problem of its induction, would be apprehended more accurately if it were regarded as unrelated, if not actually opposed, to ordinary suggestion. The evidence consists of various studies in which the members of groups have been ranked in degree of hypnotizability by actual group hypnosis, and then tested and studied as to other personality traits directly or indirectly related to everyday suggestibility. The lack of critical attitude inevitably implied in ordinary suggestibility has not been found to be a factor in hypnotizability. On the contrary, results would seem to indicate that those most highly hypnotizable are, on the average, slightly more critical and less suggestible in everyday life than are the less hypnotizable individuals. The more ascendant individuals, by test, have been found to be somewhat *more* hypnotizable than the less ascendant, contrary to a common supposition that the more submissive persons are the more suggestible and also the more hypnotizable. A high degree of hypnotizability has been found to be normal in the sense of being a desirable trait (actually desired) and not implying such personality weakness as is frequently associated with a high degree of everyday suggestibility. The conclusions are tentative, but the method of approach through rankings in hypnotizability by group hypnosis offers many possibilities of research into the problem of hypnotizability in relation, not only to suggestibility, but also to other personality traits.

Raymond H. Wheeler. *Meaning and Symbolism.*

(1) Meaning is that quality of experience which accrues from the organization and unity of any given mental process; *i.e.* unity exhibits a quality of its own. It is an abstraction from the behavior of the individual—a segregated whole. Much confusion has arisen regarding the relationship between analyzed and unanalyzed experience. Introspective analysis destroys the process analyzed. The bearing of this problem upon meaning and symbolism is brought out. The question then arises: from what sources do meanings derive their qualitative aspects?

(2) A distinction should be made between the logic and the psychology of symbolism, but this distinction is seldom made. It is doubtful, from a psychological standpoint, whether there are symbols, substitute responses, vicarious functions, and the like. This position is illustrated and compared with a proposed physiological basis of memory. The so-called symbol is not a substitute response or a substitute stimulus, but a stimulus which elicits a response, incomplete when compared with the original, yet resembling certain aspects of the original.

(3) Characteristic differences between primitive and highly complex brains are brought out in presenting the physical basis of that behavior which is said to involve 'symbolic activity' and behavior which does not. These differences have to do with the ratio of surface area to the volume or mass of the brain.

(4) Meaning and symbolism are not synonyms. In a psychological sense meaning is not a reference to something else. When words come to 'represent' objects, behavior has evolved to a higher plane and is of a different kind from that which merely involved response to objects. Objective reference, imminent objectivity, and intentional inexistence, as psychological problems, belong to history.

Raymond H. Wheeler and Theodore Perkins. *Learned and Unlearned Responses in the Goldfish.*

When three lights are altered in intensity and in position each time for eleven consecutive trials, so that no one combination of intensities and spatial arrangement is the same on a given day, goldfish learn to secure their food from the relatively brightest, the relatively dimmest (sometimes dark) and the relatively middle intensity. Many of the resultant curves reveal steep ascents: the animal shows sudden spurts of 'learning,' which may be considered criteria of 'insight.' By insight we mean organized response at the level of conscious behavior.

The behavior of the goldfish in this experimental situation reveals many interesting qualitative features some of which are akin to 'initial delay.' Other qualitative features of goldfish behavior indicate the importance and value of some such concept as 'insight' even in this relatively primitive type of animal.

A striking 'unlearned' response was exhibited by practically all the fish under the conditions prescribed by the experiment. They started out repeatedly to enter the compartment containing the light of relatively 'middle' intensity: fish chosen to learn the 'middle' light made almost perfect responses at the outset. This behavior was not nearly so evident when stereotyped combinations of three lights were used. An explanation of these results can be made in terms of the law of least action.

E. D. Wiersma. *Forms of Personality.*

Every individual reveals himself to his fellows through three vital expressions, namely, through his bodily build, through his physiological functions, and through his mental condition. We may therefore speak of an anatomical, a physiological, and a psychological personality, which are connected with each other.

The connection between bodily build and consciousness is shown in the first place by the fact that the Nordic and the Alpine races, which form the principal part of the population of the Netherlands, are characterized not only by their bodily build, but also by particular temperamental qualities. In the case of the Alpine race the working of the content of consciousness is more intensive (primary function), whereas in the case of the Nordic race it is the after-effect which is more intensive (secondary function).

In the second place, the various types of constitution (the fine and slender, the thick-set, and the coarse and robust) possess, in addition to the peculiar physical characteristics, very particular temperamental qualities. The fine and slender differ from the average person in having a somewhat slighter activity and a somewhat stronger emotionality, the thick-set in greater activity, slighter emotionality and stronger secondary function, whilst the coarse and robust deviate but slightly in temperamental qualities from the average.

The connection between physiological functions and consciousness appears distinctly in the connection between the nature of the rhythm of movements and temperamental qualities. We distinguish the persons who perform every action in a rapid *tempo* from others who do everything slowly, those who do everything hastily, hurriedly and unquietly from those who do everything calmly and quietly. According to these physiological qualities we can distinguish various *tempo*-types, namely, the quick and the slow *tempo*-types, the quiet and the unquiet *tempo*-types.

The quick *tempo*-type, whose movements are always executed more rapidly than the average, is psychologically characterized specially by a stronger primary function, by a slightly increased emotionality and activity. The slow *tempo*-type, on the other hand, displays a greatly reduced activity and a less increased secondary function.

The quiet *tempo*-type deviates but little from the average in the qualities of temperament. The unquiet *tempo*-type, on the other hand, whose movements are characterized by flurry and haste, is specially distinguished by deficient activity and very great emotionality.

There is further a second group of physiological phenomena in which people differ from one another, namely, the autonomic functions. These include, for instance, the cardiac action, the respiration, the secretion of sweat, the temperature of the skin, the defecation, *etc.* The persons with some of these functions increased, for instance with rapid pulse and respiration, increased secretion of sweat, *etc.*, may be called the hyper-autonomic type. Opposed to these are persons of the hypo-autonomic type, with the functions mentioned below the average.

Investigation has shown that the increase of the autonomic functions (the rapid pulse and respiration, the increased temperature of the skin, the greater secretion of sweat) points to increased emotionality, whilst the activity and the psychical after-effect exercise less influence on them.

EDMUND G. WILLIAMSON. *The Factor of Learning in Spelling Ability.*

One hundred high school seniors were drilled for six consecutive daily periods in learning to spell 60 Esperanto words. The subjects had eight minutes daily for study after which Esperanto words were dictated orally. Plotting the average number of words correctly spelled each period gives a very satisfactory learning curve increasing from an average of 16 the first trial to 44 the sixth trial. The odd *vs.* even days reliability of the Esperanto words is + 0.98. The initial trial is correlated + 0.84 with final trial (+ 0.90 when corrected for attenuation).

A spelling test of 90 English words was given to the subjects at the beginning and end of the experiment (an interval of two weeks), consisting of 40 of the most difficult words of the Van Wagenen Spelling Scale and 50 apparently difficult words selected at random from Roget's *Thesaurus.* The test-retest reliability of these 90 words is + 0.95. The sixth trial on Esperanto words is correlated + 0.68 with the spelling test and + 0.56 with the 1929 Minnesota College Aptitude Test. This latter test consists of 480 vocabulary items and has an odd-even reliability of + 0.95. The sixth trial on the Esperanto words has an odd-even reliability of + 0.97. This sixth trial is correlated + 0.37 and + 0.14, respectively, with speed of reading and cancellation of A's. The spelling test is correlated with Minnesota College Ability Test + 0.66, and + 0.33 and + 0.10, respectively, with speed of reading and cancellation of A's. A vocabulary test was constructed using the 90 English words which correlated + 0.69 with the correct spelling of these same words, + 0.63 with the learning test, and + 0.79 with the Minnesota College Aptitude Test.

Learning, intelligence, and knowledge of meaning of words are all related in about the same degree to the spelling of English words. By the methods of partial and multiple correlations, correction for attenuation, and tetrad differences it is shown that there is a common factor in the vocabulary, spelling, and learning tests, which is probably a common linguistic factor. A statistical comparison of 'good' and 'poor' spellers is made to determine the influence on spelling ability of the following factors: sensory defects, intelligence, visual and auditory perception, learning ability, knowledge of meaning of words misspelled, and various personality traits.

A. L. Winsor, see T. L. Bayne.

E. S. Winters, see T. L. Bayne.

Wilhelm Wirth. *Eine Welt jugendlicher Bildkunst.* [Editor's Abstract.]

A series of photographic slides was presented showing drawings and water-color sketches by the author's brother when from thirteen to fifteen years old. He was without technical training, and the pictures represent a world of pure fantasy. The sources of their various subjects in the boy's experience were traced by the author. The pictures indicate an increasing degree of withdrawal from the actual world, the scene of the later ones being laid in the planet Saturn.

Wilhelm Wirth. *Die exacte Kontrolle des inneren Verhaltens in der Psychophysik.*

Die Psychophysik im engeren Sinne sucht gesetzmässige Beziehungen zwischen physischen, exakt messbaren Grössen, die durch seelische Vorgänge vermittelt sind. Das Webersche Gesetz ist z. B. eine solche Beziehung (insbesondere eine Proportionalität) zwischen der physischen Intensitätsstufe x der eben unterscheidbaren Reize x und x + d einerseits und ihrer physischen Differenz d andererseits. Seelisch vermittelt ist sie deshalb, weil die Unterscheidbarkeit ein seelischer Tatbestand ist, der die bewusste Vergleichung der Reize x und x + d voraussetzt. Diese

seelische Vermittelung schliesst stets *eine bestimmte innere Haltung* ein. Beim Weberschen Gesetz in der gewöhnlichen Bedeutung werden z. B. eine möglichst gute Auffassung beider Reize, also Konzentration der Aufmerksamkeit, günstige Disposition und vollständige Einübung vorausgesetzt. Es ist sehr wichtig, dass die Versuchsperson eine Instruktion für ihr inneres Verhalten befolgen kann, insbesondere auch bezüglich der seelischen Maximalleistungen der Auffassung, Vergleichung, Reproduktion, Willkürreaktion usw., die jene psychophysischen Beziehungen vermitteln. Die Systematik, welche diese Leistungen nach ihren inneren und äusseren Bedingungen ordnet, umfasst daher alle Gesetze des Seelenlebens und lässt sie unter bestimmten Gesichtspunkten in exakter Form analysieren.

Eine konkrete Vorstellung von dieser Kontrolle wird in der Untersuchung des Einflusses gegeben, welche verschiedene Verteilungen der Aufmerksamkeit im Sehfeld auf die Disposition seiner verschiedenen Punkte, bei unwissentlicher tachistoskopischen Aufhellung apperzipiert zu werden, ausüben (auf das Relief der Schwellen, die von mehreren, gleichmässig über das Feld verteilten Punkten gewonnen sind). Die früheren Ergebnisse von Wirth, die mittels seines Projektions-Perimeters erlangt wurden, sind jetzt von Guratzsch bestätigt und erweitert.

Endlich wurde noch ein neues, noch nicht veröffentlichtes Resultat dargelegt: Man nehme *je eine Häufigkeitskurve* aus diesen Schwellen aller Punkte im Sehfeld, die bei dem nämlichen inneren Verhalten abgeleitet sind, und vergleiche die Kurven von verschiedenen Verhaltungsweisen der Aufmerksamkeit mit einander. Durch diese Ordnung der Schwellen nur nach der Häufigkeit ihrer einzelnen Werte erhalten wir ein rein statistisches Zufallsgesetz: *Wir finden für alle inneren Verhaltungsweisen das Gauszsche Gesetz, mit umso grösserer Genauigkeit gültig, je natürlicher und konstanter diese Verhaltungsweise ist.* (Der Mittelwert des Kollektiv-Gegenstandes und sein mittlerer Fehler sind bei den verschiedenen Verhaltungsweisen verschieden.) Dies Resultat zeigt fürs erste, wie *im seelischen Leben sich die systematische Abhängigkeit* (d. h. in unserem Beispiel das

Anwachsen der Schwellen mit dem Abstand von dem Focus der Aufmerksamkeit *mit der Gültigkeit eines rein statistischen Gesetzes verträgt,* wenn wir die Werte nach verschiedenen Gesichtspunkten ordnen. Weiterhin ist das Gauszsche Gesetz hier *ein Gesetz der Verteilung der seelischen Energie in einem bestimmten System psychophysischer Elemente,* unabhängig von der speziellen Form der Aufmerksamkeit, ähnlich wie in der Physik das Gesetz für die Geschwindigkeiten der einzelnen Moleküle in einem Gas bei bestimmter mittlerer Temperatur und stationärem Zustand. Aus dieser Tatsache lässt sich die allgemeine Gültigkeit des Gauszschen Gesetzes für die ontogenetisches und phylogenetische Statistik geistiger Fähigkeiten und die Anwendbarkeit des Spearmanschen Rangkorrelations-Koeffizienten auf solche Probleme wahrscheinlich machen.

W. Wirth. *The Threshold as a Variable.*

The notion of a threshold (the just perceptible difference between two compared stimuli) is conceived by Urban in a positivistic manner as a directly observable phenomenon, *i.e.* as a point of change of judgment in a single series of judgments ('less,' 'equal,' 'greater'), a point which we can observe as in Wundt's method of minimal changes where the subject is given a series of increasing or decreasing variable stimuli. However, we can observe the threshold in this manner only upon the condition *that it is constant,* so that the relative frequencies of the judgments in a complete series of the constant method would have only two values, 1 and 0, and would fall from 1 to 0 or rise from 0 to 1 at this fixed point of the change of judgment. In reality, on the contrary, the frequency-curves observed have the well-known form of the Φ-function and suggest the hypothesis that the threshold is exposed to occasional oscillations. Therefore we must always suppose that the threshold can change from one test in the series to the next, so that it is not necessarily identical with the change of judgment between two immediately successive steps of the variable stimulus. Thus the notion of a threshold that is extant at a certain moment of the experiment is a mere hypothesis. *The threshold is never observable in itself,* and it is certainly not metaphysical as Urban implies in referring to my notion. Nevertheless, it is a thoroughly empirical factor, which can always be individually reconstructed as a statistical quantity derived from the observed frequencies of the judgments. By statistical procedure we can also calculate median values of the threshold with a certain degree of precision, measurable in a standard deviation, as we can do for all occasionally oscillating values.

KÄTE WOLF. *Baby-Tests: Series for the Second Year of Age.*

An Stelle der einseitigen Intelligenz- und Leistungstests, aus denen die meisten heute üblichen Testsysteme aufgebaut sind, haben wir versucht, Tests ausfindig zu machen, durch die die Entwicklungshöhe des Kindes festgestellt wird. Derartige Testreihen wurden für das erste Lebensjahr von mir bereits im Band 107 der *Zeitschrift für Psychologie* publiziert; für das 2. Lebensjahr haben H. Hetzer und L. Koller diesen Sommer eine entsprechende Testreihe fertiggestellt. Für einen Entwicklungstest kommen nur Aufgaben in Frage, die das erfassen, wodurch sich in charakteristischer Weise ein Entwicklungs- und Reifestadium von dem vorangehenden unterscheidet. Nicht eine beliebige mögliche Leistung, sondern die den Entwicklungsschritt und die Reifestufe eindeutig bezeichnende Leistung ist zu fordern. Bei Beurteilung der Entwicklungshöhe eines Individuums kann man sich nicht auf zufällig ausgewählte Einzelleistungen beschränken, sondern muss alle Dimensionen in Betracht ziehen, nach denen hin die menschliche Persönlichkeit sich auswirkt. Sinnesleistungen, soziales Verhalten, Wille, Affekt und Körperbeherrschung sind bei einer derartigen Betrachtung ebenso wichtig wie Intelligenzleistung, Sprachfähigkeit und manuelle Geschicklichkeit. Da es bei einem Entwicklungstest nur dann einen Sinn hat, eine Leistung zu prüfen, wenn sie einen Neuerwerb für die betreffende Altersstufe vorstellt, sich die Funktionen aber nicht auf jedem Gebiet von Stufe zu Stufe gleichmässig entwickeln,—für die Säuglingstests beträgt der zeitliche Abstand dieser Stufen nur einen Monat—so wird naturgemäss jeder Test im Aufbau nicht exakt dem andern gleichen. Sinnesentwicklung wird im ersten Halbjahr, Sprachentwicklung erst im 2. Lebensjahr berücksichtigt werden müssen. Das verschiedene Entwicklungstempo bringt es auch mit sich, dass im 2. Lebensjahr nicht mehr für jede Monats- sondern für jede Vierteljahrsstufe Testreihen aufgestellt werden konnten. Der entwicklungsbedingte Unterschied, der in der Zusammensetzung der einzelnen Testaufgaben bei verschiedenen Altersstufen seinen Ausdruck findet, wird aus einem Vergleich der Testreihen für das erste und zweite Lebensjahr deutlich.

M. H. Wood. *Thinking as Vital Process: a Suggested Restatement.*

1. *Educational psychology and the application of scientific principles to practical problems.* Science begins by finding relevant aspects of phenomena, and advances by superseding the less by the more comprehensive concepts. So, in psychology, mental 'faculties' (imagination, will, memory, even the time-honored dualism of soul and body) are superseded by the concept of life as response to stimulus. The simplest form of life, protoplasm, is characterized by 'irritability,' *i.e.* it reacts to appropriate stimulation. Organic life exhibits a certain order of activity rising from the simpler to the more complex—the colloidal, the cellular, the organismic. The life impulse (*horme, elan vital*) is the "tendency of the organism to secure and to retain its vital stimulations."

2. *Development of the human individual viewed as a form of life* (*i.e.* development of pattern-reactions in response to appropriate stimuli, from the prenatal stage, each cell or organ living its life as conducive to a potential unity, a whole 'self'). This self comes into being only as coördination advances. 'Objects' or 'meanings' constituted by permanent reaction-patterns begin as mere conditioned reflexes. An infant's 'seeing' or 'hearing' differs from an adult's reaction-patterns; it is much more frag-

mentary, beginning with mere reflex response to light or sound, then gradually involving other centers of reaction.

3. *The self in the making* (right and wrong habits, *e.g.* in eating and sleeping; the 'problem child'; liking and disliking as part of vital process in terms of reactions to stimulus). In the beginning of thinking, a familiar stimulus touches off a reaction pattern; if the resulting stimulus proves unfamiliar a new pattern arises, or, failing this, a disturbance follows (*i.e.* there is an 'emotional' reaction to a new situation).

'Emotion' as enhanced metabolism supplies energy for new coördinations. There are native differences here, as also in sensitiveness of sensory or motor elements resulting in differences of 'temperament.'

4. *The bearing on educational practice.* Learning means acquiring new reaction-patterns, therefore it is essential to give full scope for variety of activity. Poverty of thought is poverty of acquired reactions (*e.g.* if school education is confined to speech or writing), and thinking involves all sensory and motor centers, not merely those of speech.

HERBERT WOODROW. *Motor Reproductions of Rhythmical and Temporal Stimuli.*

A study has been made of the reproduction of short empty intervals of time varying from 0.2 to 30.0 seconds. Numerous precautions, neglected in the early work on this subject, have been carefully observed, in the belief that it is possible to establish trustworthy conclusions concerning the nature of the constant and variable errors.

HELEN T. WOOLLEY. *Are Tendencies to Criminal Behavior Observable and Alterable in Young Children?*

I. Tendencies to criminal behavior are observable in early childhood.

II. Such tendencies can almost always, and perhaps always, be counteracted by wise and understanding training.

HELEN T. WOOLLEY. *The Psychogenic Factor in Relation to Age.*

Within the memory of the present generation of psychologists, methods of experimental determination of the level of individual mental ability have been developed. Most of us believe that mental level is an inherited aspect of personality. It then becomes important to know at how young an age the level of ability of the individual can be measured. We can all remember a period when those of us who were measuring the mental level of adolescents were told that we were wasting effort in measuring a level which might be completely changed by the time the individual reached adult years. Our faith that mental ability measured in adolescence, and at much younger ages, is permanently indicative of the capacity of the individual in question, has been steadily growing. Within the last few years we have been given several series of tests measuring the level of mental ability of individuals of pre-school age. One need mention only the tests of Kuhlmann's Binet in the infant period, or Rachel Stutsman's performance tests for children from 18 months to five years of age, or the tests of Charlotte Bühler and her students, Hetzer and Wolf, for babies under one year of age, and the developmental norms from birth up to twenty-four months furnished by Gesell.

These contributions bring some evidence that level of intelligence and probable rate of mental development may be recognized, and to some extent indicated by experiments, at less than five years of age with certainty, and perhaps at less than two years. Indeed, Gesell states in his study of infancy and human growth that the probable rate of development of a baby can be noted as well at two months of age as at two years.

One must take a little time to reflect on what it might mean for educational, and for social policy, if the mental quality of human individuals can be recognized, and in part measured, in early infancy.

C. S. Yoakum. *Analysis of Factors in Vocational Progress.*

Vocational histories offer the preliminary data for determining the relative importance of the several factors affecting progress. They cannot, as ordinarily obtained, do much more than this. The essential data evidently lie in factors that carry a considerable element of chance and that are as yet not measured. Such factors as age, experience, titles of positions, and even salary, show little intercorrespondence. Differentials as shown in the following paragraph should give us the basis for more searching studies into the personal and other factors which actually influence progress.

A study of slightly over one hundred graduates who took three or more courses in accounting shows: that there has been no noticeable rise in initial salaries; that the average yearly advance in salary is approximately three hundred dollars; that the sixteen per cent who advance most rapidly in salary, advance about three times more rapidly than the lowest sixteen per cent; that the correspondence between years of service and salary is represented by a correlation of $+0.34$; that changes in duties sufficient to be considered a new job occur, on the average, once in eighteen months, with a median of twelve months; that, although the average length of service is two years, those of more recent experience (five years and less) show an average of fourteen months, indicating that promotion is almost coincident with change of firm.

Joseph G. Yoshioka. *Discrimination and Preference in Animals.*

De Camp found that the rat, being given two paths in a simple maze would take the shorter of the two. I confirmed De Camp's finding with 197 rats that ran a maze where the pattern remained constant, while the length varied. The maze-distance was discriminated, and Weber's law was found to hold. In the next series of experiments 397 rats ran a maze where the length remained constant, while the pattern varied. One group was given a choice of two equilateral-triangular paths parallel all the way through; the rats showed no discrimination. Another, being given a choice of triangular and pentagonal paths, preferred the pentagon. The third chose the nonagon, when the triangle and nonagon were given for a choice. The nonagon, however, was not preferred to the triangle any more than the pentagon. The fourth failed to discriminate between the pentagon and nonagon, thus checking up the foregoing results. The fifth, in choosing between the triangle and heptadecagon, preferred the latter; but the heptadecagon was not preferred any more than the pentagon to the triangle. The sixth showed no preference between the pentagon and heptadecagon, thus confirming the results. The seventh, in choosing between the triangle and pentagon No. 2, formed by cutting a little notch at one vertex of the triangle from which it differed the least, preferred the pentagon No. 2. The eighth was a self-controlled group; the rats were given a choice of two triangular paths parallel all the way through, and only those that would choose each of these half the time were selected. Out of 157, 30 such rats were obtained. These selected 30 were then allowed to choose between the triangle and pentagon No. 2, and found decidedly to prefer the latter (critical ratio ± 2.49).

In these experiments there are two things involved: discrimination and preference. In animals, in which a verbal report is impossible, discrimination can only be expressed by preference. Theoretically discrimination must precede preference, but in human experience discrimination need not be followed by preference. A rat may choose one path consistently as a result of preference of that path, or as a result of failure to discriminate that path from the other. In order to check up this point the rats in the last group, after the choice series had been completed, were made to break the preferential habit by conversion of the preferred path to a ' non-reward ' one. The selected ' 50–50 ' rats were found to break their preferential habit much more easily than the rest of the group. The rats that formed a position-habit in the first series seem to have failed to discriminate one path from the other.

It is, therefore, concluded that preference in maze-patterns can be demonstrated in rats, and it is hoped that this is a first step toward understanding the basis of human preference as independent of the effects of environment.

KIMBALL YOUNG. *Historico-Genetic Study of Personality.*

An examination of approximately 250 life histories indicates that such documents expose many of the situations out of which personality characteristics grow. A tentative statistical analysis of these situations is attempted. By examination of sample cases some indication is given of the importance of the historico-genetic approach to the study of personality. This investigation is a part of a larger undertaking in which the life histories will be correlated with other measures, like intelligence tests, tests of emotional traits and ratings.

PAUL C. YOUNG. *A Critical Examination of the Theories of Suggestion.*

This study proposes to show that there is an underlying basis for agreement in most of the theories of suggestion, whether those theories postulate submission-dominance, the love relation, a primitive faith-attitude, an instinct arising with herd existence, or what not, as fundamental. The unifying conception in all these theories, and the hypothesis defended in this paper, is that suggestion, far from being a process of dissociation, is really a synthesis of elements in consciousness, which in the course of man's adjustment to environment have become divorced. Especially is this true of the intellectual and the affective functions, but to some extent it is also true of the general functions of the central nervous system and of the autonomic. Instead of a regression from a cortical level to a lower level there is an integration of cortex and autonomic system comparable with that seen in vicarious functioning of brain parts. This conception pictures suggestion, as well as sleep, as an integration at a higher level than ordinary consciousness, in the same way that the Mississippi River above its delta represents a synthesis of elements which in the delta move in different directions toward various goals.

The problem as to the priority, as well as the superiority, of auto-suggestion and hetero-suggestion is resolved by this theory, in as much as all hetero-suggestions are for the purpose of inducing the condition in which perceptions and affects are undifferentiated. On the other hand, the state is self-induced in auto-suggestion and in negative suggestibility. So auto-suggestibility seems the more fundamental category. From another angle this statement holds: in states characterized by great hetero-suggestibility, as hysteria and manic-depressive psychosis, auto-suggestibility is often greatly increased; whereas in conditions of great auto-suggestibility, as dementia praecox and paranoia, hetero-suggestibility is sometimes altogether absent.

PAUL THOMAS YOUNG. *A Pseudophonic Study of Auditory Space.*

A previous study revealed a sharp cleavage between two types of sound localization, viz. (1) auditory and (2) visual-auditory. The present paper reports an investigation of the first type by means of a pseudophonic technique.

Rubber tubes connected to a stethoscope were passed through a wall to sound-receiving trumpets (artificial pinnae) in an adjoining room. These trumpets were fastened with their surfaces parallel and at a distance from each other of 17 cm. Faint clicks, produced when a 4- to 5-volt current was made and broken through a telephone receiver, served as stimuli. The apparatus was tested for sound-leakage to insure that all sound energy reaching the subject's ears came via trumpets and stethoscope. With the above arrangement the auditory space of six subjects was explored.

The subjects localized all sounds in the rear of the head. The sounds were on an arc at the level of the head extending right and left towards the aural axis. The experiment confirms a theoretical expectation that there is no basis in the stimulus for differentiations between up and down, front and back.

Why is auditory space confined to the rear of the head? What within the organism normally determines auditory localizations as front, back, up, down? In an attempt to answer this question the angular relations of the two trumpets were varied. Despite these variations the sound localizations remained in the rear. There was, however, modification in the estimation of distance between the phantom and the head. The range varied from a few inches to two or more feet. Auditory distance was found to depend upon the total physical energy stimulating the ears; the greater the energy the nearer the phantom.

Auditory distance and direction were found to depend upon the spatial relationship between source and trumpets, and hence upon the diotic stimulus regardless of the position of the subject's head. It is possible, therefore, to introduce an indefinite variety of discrepancies between auditory and visual space by means of the pseudophone. For example, a source placed at any given point in visible space may be heard as due right or due left by properly directing towards it the axis of the trumpets. The possible types of discrepancy between visual and auditory space can be readily predicted on the basis of the present results.

The experiment as a whole suggests a simple technique for distinguishing between external and physiological conditions of auditory space.

SERGE YOURIÉVITCH. *The Ocular Cineograph and the Principal Characteristics of the Ocular Movements.*

The Ocular Cineograph.

The method employed till now has been an optic one consisting in photographing the displacements of a reflected ray of light projected on the cornea or on a little mirror lightly bearing on the closed eye-lid. This method implies abnormal conditions: a dark room, the eye disturbed by contacts of lever and light rays and also an expensive laboratory organization.

I applied myself to seek a method which would leave the eye in its normal state, that is, without contact of mechanisms, and would permit that the researches be made in a light room with simple means requiring scarcely a laboratory. The method consists in employing the Marey tambour connected through a tube with a cavity of small dimension surrounding the eye and forming, so to say, a second tambour coupled to the first. The displacements and the modifications of the air volumes produced by the movements of the eye ball, the surrounding teguments, and the eye-lids in this cavity give, on the smoked cylinder, broad and clear curves characterizing the principal directions of the eye movements. This allows us to employ portable registering apparatus like the polygraph of Boulitte with paper strips and ink pen.

I obtain the cavity connected with the eye by making a plaster of Paris mould on the face including the two eyes, the forehead, the upper part of the nose, the cheeks and the temples. This plaster mask maintained by ties fastened behind the head adheres air-tight to the orbit of the eye. Glasses for the eyes to see through may be fixed in the walls of the mask. Thus one or both the eyes may observe and register at the same time. Usually one of the cavities is slightly carved out to leave the movements of the eye-lids free. Then the registering eye moves in the dark synchronously with the other eye looking through a wide opening in the plaster mould. This opening does not have to be covered with glass. I have at times used also rubber swimming spectacles or automobile glasses.

This method allows registration of the eye movements for hours without interruption or fatigue.[1]

The Principal Characteristics of Ocular Movements.

I have registered with the ocular cineograph more than 20,000 eye-movements. Working with a dozen subjects I have had the eye follow, with normal or maximum speed, straight lines, parabolas, hyperbolas, broken lines, ellipses, circles, parallels and surfaces. This study demonstrates two orders of phenomena of equal importance: (1) *arrests* and (2) *movements*.

Arrests. In following a line the eye, in order to change the direction on account of an angle or of a pronounced curve, is obliged to make an arrest. These arrests vary from 0.2 to 2.0 seconds. The visual angle more rapidly achieved implies an ocular movement of less effort.

Movements are of two sorts. Rapid movements vary from 0.02

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[1] The method and the first results of its application were communicated to the French Academy of Sciences in my name by Professor d'Arsonval in three notes: *Comptes rendus,* 187, 1928; 844f, 1160; 188, 1929, 937.

to 0.06 seconds and slow movements vary from 0.1 to 0.2 seconds. Some visual angles of 25° to 60° are generally encompassed in one or two movements—sometimes, however, by short and rapid movements which are interrupted by short arrests.

The arrests and the movements are two elements of energetic constancy for the same exertion. If the movements are rapid, the arrests are long, and *vice versa.* In following a line with the maximum speed, if the voluntary effort shortens the arrests, the movements, on the contrary, become slower.

The character of the movements and of the arrests differ according to the horizontal or vertical displacements of the eye. In the vertical movements the arrests, with the subject in a standing position, are always shorter at the top, amounting to 50 per cent of the time of the arrest at the bottom for certain subjects. This phenomenon, constant in a standing position, is reduced or may disappear in a recumbent position. This 'reverse' phenomenon was suggested by Mr. d'Arsonval. It is to be noted that in standing, the normal position of the eyes is directed 4 or 5 yards beyond the subject's position on the ground. In the vertical axis the movements of elevation are precise, indicating an effort and are ordinarily slower than the movements of descent, which are of a more indifferent character. The greater effort for elevation combined with the short arrest at the top, the indifferent movement of descent, and a long arrest at the bottom, would imply a mechanism of vertical movements comparable to the up-and-down movement of the arm. The movements of elevation are accompanied by raising the eye-lids and the displacement of numerous teguments. So they are always movements of the greatest effort.

In *horizontal movements,* the arrests very often represent a reversal of movement direction. To the right or the left the arrests are of a similar duration. The movements are rapid and equivalent for the two directions. In these movements the ocular globe alone displaces itself. So the horizontal movements require only a feeble and indifferent effort, which determines their psychic value. The oblique lines have intermdiate character.

G. P. Zeliony. *Method of Investigation of Associative Reactions.*

By this method two associative (conditioned) reflexes to one and the same stimulus are examined in the dog simultaneously and parallelly: (1) the salivary (involuntary reaction) and (2) the motor (voluntary reaction). The salivary reflex is registered in the way ordinarily used at Leningrad; the motor reflex by a special method.

A box on supports is placed in front of the dog. On the side of the box next to the dog there is a door, so arranged that it opens when slight pressure is made upon it. The dog is fed in the box by a special arrangement. The associative reflex is elaborated thus: at the given signal the dog presses with its paw on the door, and it opens or not according to the desire of the experimenter.

The special device of the apparatus consists in the possibility of removing the central part of the door, leaving only a wire screen through which the dog can see the food in the box. At first the dog is fed several times from the box, then the door is closed. The dog sees and sniffs the food through the wire, and begins to press on the door in order to remove the obstacle. It is necessary only to make the signal and the feeding simultaneous with this movement in order to elaborate the conditioned reflexes quickly, *i.e.* the signal itself begins to call out this movement.

There is an attachment which permits the strength of the pressure of the paw against the door to be measured. For certain purposes (for example, to extinguish an associative reaction to a given stimulus) an electrode can be fastened to the door, so that an electrical shock results from the pressure of the paw on the door.

It is evident that the motor reaction can thus be studied and isolated without registering the secretory reaction by a special apparatus. Such a method presents certain advantages: (1) it is unnecessary to fasten the dog in a harness which might have an inhibitory action on the reflexes; (2) the experiment can be lengthened as one desires, for the dog may sit, stand, lie down, and does not become fatigued; and (3) the undesirable influence of the special chamber on the experiment is avoided. In the older method the dog must be brought into the room many hours before the experiment, or the experiment must be lengthened several hours; moreover, it is obligatory that the experimenter be isolated in an adjoining room. By the present arrangement the experiments may be carried out in the same room where the dog lives without changing anything.

It should be added that one of the most abrupt changes in the environment for the dog is placing it at an elevation on a table. Therefore in the author's laboratory in those cases in which it is impossible to dispense with a stand, the dog is placed directly on the floor and not on a table.

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